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A

TREATISE

ON THE

ORIGIN, QUALITIES,

AND

CULTIVATION

OF

MOSS-EARTH.

> Where the deep fen, or dark moraſs now lies,
> Tall trees may grow, and richeſt verdure riſe:
> And where cold damps, and hoary mildews ſpoil
> The ſtunted growth of a neglected ſoil,
> O'er clover fields, a richer breeze might play,
> And milder dawns proclaim a milder day.

By **WILLIAM AITON,**
WRITER, STRATHAVEN.

GLASGOW:
PRINTED BY NIVEN, NAPIER AND KHULL, TRONGATE.
1805.

BODLEIAN
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TO THE

HIGHLAND SOCIETY

OF

SCOTLAND.

MY LORDS AND GENTLEMEN,

IT has been cuſtomary for authors to dedicate their writings to thoſe whom they moſt eſteemed, or whoſe patronage they were ambitious to procure. In making that ſelection, I can perceive none ſo proper as your moſt reſpectable ſociety. The high birth of ſo many of you; your literary acquirements; the rank you hold in the ſcale of ſociety; the zeal you have ſhown in promoting many branches of national improvement, and particularly the cultivation of moſs, which few elſe have duly attended to, have deſervedly raiſed you high in the eſtimation of your countrymen.

The anxiety you have ſhown to promote the cultivation of moſs, evidences the wiſdom and patriotiſm by which you are actuated. The points to which your inquiries are directed are of the firſt importance, and every well-wiſher to his country will rejoice in your ſucceſs, in an exertion ſo laudable.

It is likewiſe of great importance, to excite among the occupiers of moſs land, a ſpirit of improvement and induſtry, without which the greateſt diſcoveries can avail but little. The modes of cultivation known, though ſuſceptible of much improvement, are ſuch, as when proſecuted with due perſeverance, promiſe an ample recompence to the induſtrious cultivator. The greateſt difficulty ſeems to be, to get the attention of the tenantry directed to that ſpecies of improvement. My feeble efforts are no way adequate to that taſk, even in the ſmall circle to which they can be made to reach; but your influence and example among your tenants and vaſſals, will have more powerful effects.

Elegance of ſtyle, or even correctneſs in diction, are not to be expected from one who has not had the advantage of a liberal education; but I hope I ſhall be underſtood by the practical farmer, for whoſe uſe the following ſheets are chiefly intended. To rouſe the attention of my countrymen to a moſt important, but much neglected ſubject of improvement, was my firſt object; and next to that, it is my ambition to obtain your approbation. If this treatiſe ſhall be found of uſe to the public, and worthy of your patronage, I ſhall think my time and labour have been well employed.

I have the honour to be,

With the moſt profound reſpect,

My Lords and Gentlemen,

Your moſt obedient

Humble Servant,

Strathaven,
12th January, 1805.

WILLIAM AITON.

A

TREATISE ON MOSS.

INTRODUCTION.

Agriculture is a ſcience of all others the moſt important to mankind; yet the proſecution of it has hitherto been, in a great meaſure, left to the poor and the illiterate. Some branches of that noble art have, indeed, begun to be inveſtigated with conſiderable care; but others have not certainly been yet attended to, in any degree ſuitable to their great importance. This is particularly the caſe with the article moſs-earth.

A very large extent of the ſurface of Scotland, is now unhappily covered with that ſubſtance, which has hitherto been conſidered as almoſt uſeleſs, and is well known to be, in different reſpects, injurious: yet though it is faſt increaſing on the ſurface, very little attention has ever been paid to the ſubject. Few efforts have been made to interrupt its growth; ſcarcely any inquiry ſet on foot how to recover the ſoil it covers; how its accumulation can be prevented; or to what uſes it is capable of being converted.

The accumulation of moſs-earth, to ſuch an immenſe extent, is attended with evils of no ſmall magnitude. A large extent of ſurface, now buried under moſs, is conſidered as loſt, or, at leaſt, of very ſmall value, in compariſon of the original ſoil over which it has uſurped its ſeat. Much of that ſoil, before it was overſpread with moſs, was of the very beſt quality, and produced ſpontaneouſly trees and plants, far ſuperior to any that can now be reared by the induſtry of man. Could that ſubſtance only be removed, the ſoil it covers would be ſtill as valuable as the beſt of the land in the neighbourhood, and frequently more ſo; for the moſs does not cover merely the bare hills, but often lies deep on extenſive plains, haughs, and vallies.

To have loſt ſuch large tracts of the beſt ſoil, is ſurely a very ſerious matter. But ſtill greater evils ariſe from the accumulation of moſs. The immenſe bodies of cold, wet, ſpungy peat-earth, which now cover ſo much of the ſurface of Scotland, have (notwithſtanding the amelioration of the atmoſphere, by a more extenſive population, and improved cultivation,) ſo totally changed the climate, that even the ground which has not been buried under the moſs, is not nearly ſo productive now, as it was before that ſubſtance increaſed to ſuch an extent. This is no random conjecture. It is capable of the cleareſt demonſtrations, both from the moſt authentic hiſtory, and from facts viſible to all.

It is abundantly clear from the writings of the Roman hiſtorians, as well as from the poems of

Oſſian, that the climate of Britain was, in their times, mild, though not ſerene. *Cæſar* expreſsly ſays, that the climate of Britain was much milder than that of Gaul, and *Tacitus* corroborates the fact. Dr. Halley has ſhown that it was upon the 26th Auguſt that *Cæſar* firſt landed in Britain; and *Cæſar* informs us, that the harveſt was then finiſhed, except in one field.[*] *Tacitus* ſays, that the climate was fit for all kinds of fruit trees, except the vine and olive; and for all plants and vegetables, except a few that were peculiar to hotter countries[†] When the Romans became better acquainted with the country, they found it capable of rearing vines; and application having been made to the emperor Probus, he, A. D. 278, granted permiſſion to plant vines, and make wine from them, in Britain.[‡] Nothing is better authenticated, than that our forefathers wore no clothes; a proof that the climate was then milder than it is at preſent.

It is alſo well authenticated, that trees of a very large ſize, grew ſpontaneouſly in many parts of Scotland, where the ingenuity of men could not now rear a tree to much perfection. The Ochil hills, Arthur's ſeat, Saliſbury hills, &c. were formerly covered with wood. The names of places (to be noticed afterwards,) ſhow that wood formerly grew on many fields, which are now covered with moſs, or otherwiſe incapable of rearing wood to near the ſame magnitude they once did. The marks of the plough upon many hills, the ſize of foſſil wood, and the diminutive ſtature of ſome animals, when compared * with thoſe of former ages, afford the moſt convincing evidence of a melancholy alteration in the climate.

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[*] Cæſar de bel. Gal. lib. 4.

[†] Tacitus vita agric. c. 12.

[‡] Scriptoris hiſt. Aug. p. 942.

It is evident from the records of the religious houſes, that wheat was formerly paid annually to them, from lands now incapable of producing that ſpecies of grain. Wheat was paid to the priory in Leſmahagow, from many farms in that pariſh, on which that grain could not now be raiſed, and where it has not been ſo much as attempted for ſeveral centuries. The miniſter of Glenluce, in the ſtatiſtical account of his pariſh, mentions a farm that paid to the monaſtery of Glenluce twelve bolls wheat, and as much barley every year. But ſuch is the melancholy alteration, that, about 30 years ago, that farm only rented at L.12 per annum. The great decreaſe in the number of ſheep and cattle, in all parts of the country, is another proof of a great change in the climate. In commons, or where the lands belonged to more than one proprietor, at a remote period, they cannot now feed above one half of the number of cattle, which, it appears, from the ancient charters, they fed in former times.

But what is if poſſible ſtill more concluſive of the ſad change of the climate, is the great number of oaks found under the moſſes; many of them of very large dimenſions, in ſituations where no wood now grows, where human induſtry could not bring trees of any

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* "The red or foreſt deer, is but a puny animal in compariſon "of thoſe of former times. This will be apparent to any perſon "who compares the horns of a deer that is killed at preſent, to thoſe "of the ſame ſpecies dug from under the moſſes." Dr. Robertſon's Survey of Perthſhire, page 368.

kind to ſuch ſize, and where oaks could not be reared to the ſize of a man's ſtaff. All the moſſes in Avendale abound with foſſil wood of various kinds; and, in moſt of them, oaks of very large dimenſions are found. The late Mr Browning found an oak-tree, under a moſs, in his lands of Benthall, pariſh of Kilbride, ſo large as to garret his kitchen, 20 feet by 16 within walls. The boards, more than inch thick, may ſtill be ſeen at Benthall. Another tree may be ſeen there upwards of ſixty feet long. It has evidently been broken at both ends; and as it has ſuffered much by corruption, its original ſize cannot now be aſcertained; but at the upper end, what remains of it, is more than four feet in circumference. How far above the root this tree may have been broken, or how much of it may have remained with the top, as well as its girth, muſt for ever remain a ſecret; but as it now lies, its trunk is longer than that of any oak-tree now growing in Great Britain. At Threepwood, in Dalſerf pariſh, an oak, 65 feet long, was lately dug from under moſs. It is as ſtraight as a ſhip's maſt, and ſo equal in girth, that it is difficult to determine which is the root end. Both theſe trees have grown in about 500 feet altitude above the level of the ſea, and the ground round where they lie is very ſteril. Oaks of an extraordinary ſize, compared with any now growing, have been found in much higher ſituations. One was, about 50 years ago, dug from under Moſs-mulloch in Avendale, about 40 feet long, and ſo large, as to ſerve for a bridge over the Aven. Others near that ſize have been found in upwards of 1000 feet of altitude.

The climate of Britain was milder than that of

Gaul, and, of courſe, the trees were larger in this iſland, than upon the continent of Europe. When Archimedes built, about two thouſand years ago, an uncommon large ſhip, he could not find a tree on the ſhores of the Mediterranean ſea fit for its main-maſt. But after much ſearch, one fit for that uſe was at laſt found on the mountains of Britain. It was cut and carried to the ſea-coaſt on a machine, invented by one Phileas Toureamentus; and being tranſported to Syracuſe, became the main-maſt of that wonderful veſſel.

No ſuch trees now grow in any part of Great Britain. Some of the oaks in Hamilton park are about the ſame thickneſs of thoſe found under the moſſes, but they are not one half of the length. Theſe, however, are by no means modern oaks, but a few of thoſe of former ages, that have eſcaped the rude hands of our anceſtors. Excepting theſe, no oaks will be found in Avendale of the tenth part of the ſize of thoſe found under the moſſes in that diſtrict. Except in ſome of the banks near the foot of that river, I have not ſeen an oak-tree of ſufficient dimenſions to make a cart axle. This affords a moſt incontrovertible proof, that the climate of Britain was very different about 2000 years ago from what it is at preſent.

This mournful alteration may proceed in part from various cauſes; but it is chiefly to be attributed to the vaſt accumulation of that pernicious ſubſtance, uncultivated peat-earth. No ſoil takes in ſo large a quantity of moiſture as moſs.* It receives and retains water like a ſpunge. Moſs is alſo more retentive of cold, than any other ſoil or earth. The open pervious nature of moſs permits the froſt to enter deeper into it, than it can do into any other ſpecies of earth, and it retains it longer, than any other ſoil or ſubſtance can do. The froſt in moſs will often carry horſes and carts, when the plough is at work in the neighbouring fields. The froſty congelations, when the winter has been ſevere, will often remain in the moſs till after the middle of ſummer. The rays of the ſun, and the dry winds in ſpring and ſummer, muſt act very powerfully on ſuch an immenſely extended ſurface of cold damp moſs, and muſt exhale much cold moiſture therefrom. Evaporation from any ſoil or ſubſtance, is well known to be productive of cold. But when the exhalations are ſo great, and drawn from ſuch large bodies of damp ſpungy earth, always extremely cold, and but ſeldom free from huge bodies of congealed froſt, it cannot fail greatly to hurt the climate, and prove extremely injurious to vegetation on the neighbouring fields; eſpecially to ſuch plants as require much heat to bring them to maturity. The cold thus exhaled, muſt, at all times, greatly cool the atmoſphere, and thereby injure vegetation; and when the exhalations are not broken and diſperſed, but collected in a body, they poiſon the crop wherever they reſt.

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* 32½ ounces of dry moſs ſoil, will abſorb and retain, without fluidity, 18 ounces of water; while 39 ounces of the richeſt garden mould, equally dry, will only retain 18½ ounces of water.

Conſidering the immenſe extent of rich ſoil in Scotland now deeply covered with moſs, and the great injury theſe moſſes do to the climate and vegetation, it is aſtoniſhing that ſo little attention ſhould ſtill be paid to the reclaiming of them. Neither proprietors nor poſſeſſors, agriculturiſts nor ſtateſmen, ſeem diſpoſed to pay due attention to the intruſions of moſs. Even that worthy and intelligent ſtateſman, Sir John Sinclair of Ulbſter, M P. the reviver and patron of agriculture, appears from a letter he lately publiſhed in the newſpapers, to have only begun in the year 1802, to turn his attention to moſs culture, and was not ſucceſsful in his operations, till the preſent year 1804. The Highland Society have, indeed, done more to excite inveſtigation into the qualities of moſs, and promote its culture. But, ſo far as I know, the Board of Agriculture have not yet turned their attention to that important branch of national improvement.

Such inattention to a matter of ſo much importance, is truly ſurpriſing. Foreſts have been rooted out, lochs and ſwamps have been drained, encroachments have been made on the ſea, by embankments at great expence; every thing has been done to enlarge the ſurface of the arable land, and recover it from every other intruder But wherever the baneful ſubſtance, moſs, has once fixed its ſeat, the ſoil is abandoned to the intruder. No efforts are made to recover it, or ſo much as an inquiry inſtituted, if that can be done. If land is once covered with moſs, it is as completely abandoned, ſo far as regards improvements, as if it had ſunk into the ocean.

When it is conſidered, that, by reclaiming our moſſes, a ſixth part would be added to the productive ſoil, the rigours of the climate would be ſoftened, and the whole iſland rendered much more productive; while, at the ſame time, the cultivater would be enriched by an increaſed produce, the neglect muſt appear the more ſurpriſing. That neglect ſeems to me to proceed from the want of due attention to the nature and qualities of moſs-earth, and the uſes to which it is capable of being converted.

The illiterate farmer, who moves in the courſes of agriculture which he learnt from his parents and neighbours as ignorant and prejudiced as himſelf, cannot be expected to venture far in the cultivation of moſs, or any improvement to which he is a ſtranger; unleſs he be induced to it by the gains it offers, or compelled by the terms of his leaſe. The force of prejudices, and attachments to bad habits in agriculture, are often too powerful to be eaſily overcome, either by the authority of the landlord, or even by the more powerful temptations of gain. In agriculture, as in religion, antiquity is conſidered as the ſtandard of perfection. Innovation is always terrible to ſuch people. The moſſes, they ſay, were formed by *Noah's flood*, and have remained undiſturbed ſince; though many wiſer and better men than any of the preſent generation, have lived ſince. They aim at no more than following the example of their forefathers, who were wiſe and good men. To talk of reclaiming moſſes, appears to them altogether ridiculous.

I am by no means inveighing againſt prejudices that did not exiſt within theſe few years, and which are far from being yet removed. Above 30 years ago, the late Mr. Foulis, printer to the univerſity of Glaſgow, a gentleman of great literary and profeſſional merit, having conceived it practicable to convert moſs into a productive ſoil, purchaſed ſome extenſive tracts of deep moſs, in the pariſhes of Strathaven, Glaſsford, and Kilbride, and began to labour and crop ſome part of it. But ſuch was then the prejudice againſt moſs culture, that Mr. Foulis was, by all the people in theſe parts, conſidered as wrong-headed; and, to this day, he is mentioned as the "daft man who began to labour the moſs." This prejudice was the more unaccountable, when it is conſidered, that conſiderable improvements had, by that time, been begun to be made on Strathaven moſs. As Mr. Foulis was a ſtranger to practical huſbandry, it is probable ſome of his operations might be but ill executed; but though they had been otherwiſe, it would not have ſaved him from ridicule. The inhabitants of theſe diſtricts had, a few years before that, been wondering after Whitefield the impoſtor, whom they accounted a burning and a ſhining light; but when Mr. Foulis began to ſet them an example in practical induſtry, they held him up to deriſion. Mr. Foulis did not live to bring any of his plans to maturity, of courſe they were, by his neighbours, condemned in *toto*. Had he brought them to perfection, he might, perhaps, have been treated as *Dr. Fauſtus* his predeceſſor in the art of printing was, by the Pariſians, ſuſpected of witchcraft. But the inventer of every uſeful improvement, may lay his account with being laughed at by the ignorant and prejudiced.

But it is not the illiterate and the prepoſſeſſed only, who are faulty in overlooking the improvements of moſs. The great land proprietors, men of ſcientific knowledge, and the government, have all been culpably inattentive to that important matter. It pertains to ſcience to inquire into the theory of moſs; aſcertain its origin; of what it is compoſed; its qualities; how it may be increaſed or diminiſhed; how converted to uſeful purpoſes. They ought to inquire by what means it can be rendered productive as a ſoil, or converted into manure. Sure I am, that much pains and expence have been beſtowed by them on reſearches of far leſs importance. It is the duty, and the intereſt of the proprietors of land, to promote and encourage the cultivation of moſs, by every mean in their power. They ought to teach their tenants how to reclaim their waſte land; ſet them an example in ſuch uſeful induſtry; bind them down to it, under a well digeſted ſyſtem in their leaſes; and reward their induſtry, by premiums, to thoſe who moſt excel. If, inſtead of a *game-keeper*, *falconer*, *huntſman*, *pointers*, *hounds*, *hawks*, and ſuch traſh, our men of extenſive landed property, would engage an honeſt intelligent farmer, well verſant in practical huſbandry, and employ him on their eſtates, to teach their tenants moſs culture, and other improvements in agriculture, and conſtantly ſuperintend the tenantry therein, it would be much happier for themſelves and for ſociety. If, inſtead of ranging their eſtates in ſearch of *game* in ſuch company, they would ſurvey it occaſionally, to diſcover and reward the induſtry of their tenants; the value of their eſtates would ſoon be doubled, population increaſed, and the comforts of the human race greatly multiplied. Where hunting is the foible of the great, it alſo becomes the vice of the lower ranks. But if the expences were beſtowed on cultivating moſs, that is ſquandered on that barbarous practice, the deſert would ſoon become a fruitful field, and the increaſe of wealth would be great beyond calculation.

The culture of moſs is a matter of ſuch vaſt importance, as well to merit the attention of the legiſlature. I cannot diſcover how ſome part of the national funds could be better beſtowed, than in promoting the cultivation of moſs. The Board of Agriculture will, I hope, ſoon turn their attention to that neglected ſubject. To rouſe the attention of the public to that important matter, is my ſole object in publiſhing this treatiſe; and happy will I be, if it ſhall contribute, in the ſmalleſt degree, to that end. I ſhall offer a few remarks,

I. On the Origin of Moſs.
II. On its Qualities, and
III. On the uſes to which it may be converted.

Inquiry into the Origin of Moſs.

MANY extravagant conjectures have been formed, and ſpeculations entertained, concerning the origin of peat-earth. Only a few of theſe ſhall be mentioned.

Some have imagined, that moſs was an original or primitive earth, formed at the creation of the world. But as no marks of moſs can be traced, either in the primitive or ſecondary ſtrata of the earth, as it is only found in certain climates, and as various coins and utenſils have been found under moſs, this conjecture muſt appear unfounded.

The vulgar, whoſe ſtudy of natural hiſtory has extended no further than the peruſal of the Pentateuch, and who imagine they can trace the marks of *Noah's flood*, (as they term it,) on the face of every hill, generally believe that moſſes are compoſed of antediluvian wood, graſs, and other vegetable matter, collected into heaps by that terrible deluge. But a very ſlight inquiry into a few obvious facts, will ſerve to expoſe the abſurdity of this extravagant conjecture.

Had moſſes been formed by the deluge, the trees found in them would have either been broken by the middle, or, more likely, torn up by the roots, and the roots would have been ſtill found adhering to the tree.

But wood is ſeldom or never found under moſs, in either of theſe ſtates. I have carefully examined foſſil wood in many different counties, and I have ſeldom ever found a tree with its roots adhering to the trunk, unleſs it was the ſmall birch trees, and other aquatic ſhrubs, which have grown in the moſs, after it had riſen over the original wood to the height of ſeveral feet. I have ſeen many thouſands of trees that had evidently been cut with an axe, or ſome ſuch tool, and the roots or fangs ſtill faſt in the earth in which they grew. As many ſuch roots may be ſeen in greateſt part of the moſſes in Scotland, it is not neceſſary to enumerate inſtances. This ſingle fact affords the moſt incontrovertible evidence, that the trees found under moſſes were not overthrown, or theſe moſſes collected, by the flood.

The mark of the axe is ſeen on many trees dug from under moſs. Some have been found ſplit, and the wedge remaining in the tree; others have been found with holes bored through them, and ſome partly burnt. A piece of wood, with a wimble bore into it, was, ſome years ago, dug up from under the flat moſs, in the pariſh of Glaſsford, 10 feet deep. And I have in my cuſtody, a piece of wood about 4 inches ſquare, with a wimble bore through it, which receives my thumb, found under a moſs, on the lands of Mr. Brown of Newton, 12 feet below the ſurface. Several trees have been dug from under Strathaven moſs, with the marks of fire viſible upon them. But theſe things are ſo common in all parts of the country, that it is needleſs to mention more inſtances. It muſt far exceed even the bounds of credulity. to ſuppoſe that any of theſe operations could be performed by the delluge, or even by Noah and his family. Had only a few ſuch trees been found, they might have been conjectured to have been ſuch as had been misfitted in building the Ark. But it cannot be ſuppoſed, that Noah, and the few who believed in his prophecy, would cut down the greateſt part of the woods in Scotland, to build his veſſel, long as it lay upon the ſtocks, and large as it muſt have been.

Had moſs-earth been collected by the flood, we ſhould have found in it not merely wood, graſs, and fog,* but alſo part of every other kind of plant and vegetable, which then grew in this iſland. We ſhould alſo have found ſome of the dead bodies of the antediluvians, for whoſe deſtruction that awful deluge was ſent. It has often been ſaid, that the antediluvian world was more populous, and much more fertile, than the poſtdiluvian. What then is become of the whole other productions of the animal and vegetable kingdoms; for we find nothing in moſs but wood, and what ſome have imagined to be graſs and fog. Towns, cities, houſes, and utenſils, muſt have abounded in the old world; and had the moſſes been collected by the flood, they would have been found under it. Had this been the caſe, we might have been able to have aſcertained the exact ſtature of the giants mentioned in holy writ, as well as the dreſſes then in faſhion. Inſtead of ſearching for Roman veſſels and antiquities, in the ruins of Herculaneum, we ſhould have been able to have dug up from under our moſſes, every ſpecies of dreſs, and every kind of utenſil, in uſe in the days of Noah. The cabinets of the curious would have been enriched with vaſt ſtores of coins, armour, coats, bonnets, wigs, and ſnuff-mills, of the antediluvians. As moſs preſerves human bodies, and articles of dreſs entire, to any length of time, we ſhould not now have gazed with aſtoniſhment at an Egyptian mummy only 2000 years old; for we might have found every where human bodies in full preſervation, with their dreſs every way complete, a pattern to modern tailors, milliners, and wig-makers. The holy mother-church, too, ever diſpoſed to revere what is ancient, might have found depoſited in our moſſes, vaſt treaſures of caps, cowls, mitres, and holy relics, of double the antiquity of any now in exiſtence.

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* Fog here meant is not that haze which we ſee in the atmoſphere, when it is loaded with moiſture, but a ſpecies of moſs plants, well known in Scotland by the name of fog.

If it ſhould be alleged, that this iſland was not inhabited prior to the flood, I would aſk who was it then, that cut down all the trees whoſe roots we find every where ſo entire in the ground? Had Britain been then uninhabited, ſtill we ſhould have found reptiles, fowls, and ſuch animals as then abounded: and the dead bodies of men and women, would have been found under the moſſes, on the continent of Europe and Aſia.

Had the trees now found under moſs been depoſited there, and covered ſo deep by the deluge, they could not have ſuffered ſo much by corruption, as we find they have done. Trees floated on the waters for 40 or 50 days, and inſtantly buried deep under moſs, might have been ſplit and broken in ſome places; but they could not have been in the leaſt injured by rotting. Whatever effects their being ſo long ſoaked in damp earth, might have had in looſening the longitudinal fibres of the timber, is needleſs to inquire. But ſure I am, that had the trees been depoſited by Noah's flood, where we now find them, they would not have been in the leaſt impaired by corruption. They would ſtill have retained the bark, and the under and upper ſides of the tree would have been equally entire. This is not the ſtate in which we find them. The large trees are always much impaired by corruption on the upper ſide. I have often found a large oak, with the bark adhering to the under ſide, while corruption had diſſolved the ſame tree to near the centre above. The deluge could have no ſuch effects; but the trees being expoſed to the atmoſphere, uncovered, for many years, till the moſs roſe over them, was rotted to the middle, before they were completely enveloped in the moſs.

Had moſs been collected by the flood, the trees would more likely have been found above, than below the moſs. Green herbage, or even that which had been dried, would, after being ſeveral weeks ſoaked in water, more readily ſink to the bottom, than trees or logs of wood. After being floated ſeveral cubits above the hills, the trees could not have again returned, and each taken their ſtations in regular order where they grew, and near their own roots, as we now find them. Driven by the currents of the receding waters, they would more probably have been carried into the ſea. Such as reſted on dry land, would more likely have been laid in heaps, than in the order in which they lie. Oaks and firs would have been mixed, and laid on ſoil where neither of them grew. But we always find oaks on a clay ſoil, and firs on ſand, where their roots are alſo found in the natural poſition.

Moſſes are never to be met with in the warm climates. Will it be pretended, that the flood did not reach theſe regions?

The names of places, to be afterwards noticed, refutes the notion of moſs being collected by the flood. I can point out upwards of thirty large farms, in the neighbouring pariſhes of Strathaven and Muirkirk, all of them moſtly covered with moſs, but ſtill named by *wood*. That they were covered with growing wood, when the names they now bear were firſt conferred, cannot be doubted; and who will pretend that theſe names were antediluvian? It is not poſſible that Noah and his family, had Avendale or Muirkirk been their native place, and the ark reſted on Dungavel or Cairntable, inſtead of Ararat, could have known, and tranſmitted, to the preſent day, the antediluvian names of all the neighbouring farms. Neither was the language of Noah the ſame now in uſe.

Had the moſſes been formed of heaps of antediluvian herbage, it would have been all laid horizontally. But we find all the reeds and fibres of our moſſes ſtanding vertical; a clear proof that they have grown where they are.

The abſurdity of the notion of moſs being collected by the deluge, is further eſtabliſhed by the great number of arms, coins, and utenſils, found under it, and clearly known and aſcertained to pertain to nations as of yeſterday, in compariſon of the antediluvians.

There was found a few years ago, under the moſs of Locher, near Dumfries, a Phœnician canoe, and a Roman jug, meaſuring about four gills. The miniſter of Tinwald, in the ſtatiſtical account of his pariſh, v. i. p. 160, terms it a Roman modius; but I am rather inclined to think it was a Roman meaſure termed ſextarius.

In the ſame moſs, a leather bag, containing ſilver coins of the Saxon heptarchy, was alſo found. *

A pot and a decanter, both of Roman copper, and manufacture, were dug from under a moſs, in the pariſh of Kirkmichael, Dumfriesſhire. (Stat. Account, vol. vi. p. 60.)

A Roman camp kettle of braſs, nearly as thin as parchment, was found in the clay, under a moſs 8 feet deep, on the eſtate of Ochtertire.

A Roman medal of fine gold, with a Roman inſcription upon it, was found under a moſs, near the ſources of the Annan, on the ſide of the great road formed by Agricola.

A cheſt of Roman arms was found under a moſs, near the houſe of Lord M'Donald in Sky.

Two pair of veſſels of Roman bronze, and Roman manufacture, were found under a moſs in Genderhill, on the eſtate of his Grace the Duke of Hamilton, in the pariſh of Strathaven, in June 1803. In figure and ſize, they reſemble a common braſs ladle. One of each pair goes neatly within the other, and the inner one of both pairs, is perforated like a drainer. The holes will receive a pin of a middling ſize, and

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* Dr. Walker in relating this well known fact, adds, that "they "had probably lain there for above 1000 years, in the boundaries "between the Saxon and Celtic territories." Locher moſs is not ſituated in the march, but in the centre of what formed the territories of the Celtic or Cumbrian Britons.

are remarkably well executed, reſembling a meal ſieve, neatly cut out of ſheep-ſkin.

None of all theſe could be antediluvian. In whatever point of view the argument is placed, it muſt appear too ridiculous for ſo full a refutation, did I not know, that it is, to this day, the general opinion, in this part of the country, that moſſes were all collected by Noah's flood.

But it is not the illiterate and credulous alone that have formed extravagant and fanciful notions concerning the origin of moſs; men of letters and ſcientific knowledge, have ſometimes entertained opinions on the ſubject, which are truly whimſical. Doctor Anderſon, a gentleman of great erudition, diſtinguiſhed abilities, and a proficient in ſcience, has publiſhed, in the year 1799, a treatiſe on peat, the chief object of which ſeems to have been, to make us believe, that moſs is not formed of a collection of vegetable matter, in a ſtate of partial decay; but is itſelf a growing vegetable, *ſui generis*. In ſupport of this novel theory, or hypotheſis, as he wiſhes it termed, the learned doctor diſplays much ingenuity, and an extenſive knowledge of nature. His firſt object ſeems to have been to overturn the generally received opinions of philoſophers concerning the origin of peat-earth. He ſays, preface, page xvi. "The opinions that have been "generally entertained by philoſophers reſpecting the "origin of moſs, naturally comes under review, and "are ſhown to be totally irreconcilable to well eſtabliſhed facts."

The doctor goes on combating the hitherto received opinions, in order to make room for his heterogeneous plant, the mere creature of his own imagination; and in conducting the argument, he ſhows great keenneſs, and no ſmall degree of addreſs. When he can bring any of the general laws of nature, (with which he ſeems to be well acquainted,) to bear upon the received opinions of philoſophers, he makes a vigorous aſſault. But when any of theſe laws ſtand in the way of his favourite hypotheſis, he ſoftens his tone, and ſays, he is not afraid to record a fact, though he may be at a loſs to account for it. No fact can be better authenticated, or is more generally known, than that in proportion as the putridity of moſs advances, its inflammability is increaſed. Every one who has ſeen a peat-moſs, knows that the loweſt, blackeſt, and moſt decayed moſs, is alway more inflammable, and makes better peat, than the leſs putrid ſtrata above. Hence the upper ſtratum of moſs is laid aſide when peats are dug.* This well known fact, Dr. Anderſon ſeems to think ſtands in the way of his new plant, and after ſtating it, he adds, (p. 36.) "That is to ſay, in "other words, as it becomes putrid, it becomes more "inflammable, which is directly the reverſe of the

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* Dr. Walker, in a valuable eſſay, given in to the Highland Society, and publiſhed by them, juſtly obſerves, (p. 40. "The "blackeſt, and moſt ſolid peat, lies loweſt in the ſtratum: it is the "peat of the moſt remote æra, and is always the moſt bituminated "and inflammable. But the brown ſpungy flaw peat, lying near "the ſurface, and recently formed, though it catches fire readily, is "not capable of ſuch laſting inflammation, nor does it throw out, "upon burning, the ſame bituminous ſmell. It would appear that "the inflammable vegetable matter, combined with the vegetable "and other acids, alters by a very ſlow progreſs, and ripens more "and more in the courſe of time into bitumen. Becoming more "bituminated by age, it becomes more inflammable, acquires a "ſtronger repulſion to water, becomes more antiſeptic, and more "powerfully reſiſts the further progreſs of putrefaction."

"well known progreſs of nature, in every other caſe. "Were ſuch arguments to be admitted in phyſics, "there might be an end of all reaſoning entirely. "For it is an inſult upon reaſon, to ſay you are to "argue by analogy, while you go contrary to every "known law in nature, that ought to conſtitute that "analogy."

But after all the doctor's ſpecious reaſoning, the fact againſt which he argues, is well eſtabliſhed, and ſo univerſally known, that it would be inſulting mankind to ſpend a moment to prove what every body ſo well knows. For my own part, I can view Dr. Anderſon's reaſoning in no other light, than a trial how far his learning and abilities can go to argue mankind out of their ſenſes. If he had found himſelf at a loſs to comprehend the cauſes of the increaſe of inflammability, as the putrefaction of moſs advanced, it would have been more candid to have adopted the language he does elſewhere, (p. 74.) "I never "heſitate to record a fact, becauſe I am at a loſs to "account for it."

At the time Dr. Anderſon was ſo eagerly employed in knocking down all the received opinions of philoſophers, as to the origin of moſs; he would have us believe, that he had not formed any opinion of his own on that ſubject. He pulls down the old fabric, removes every part of it, and entirely clears the ground, before he begins to form even a conjecture what he is to rear in its place. When the firſt part of his "eſſay was concluded, the author had not been "able to form any probable conjecture, as to the "real origin of that ſingular ſubſtance." Still he goes on to cut up all the generally received opinions of philoſophers on that ſubject, and truſts to ſome after-thought for what he was to propoſe in their room. Accordingly the doctor goes on, (p. 63 and 64.) "Nothing then can be ſo abſurd, nothing ſo "contradictory to reaſon, and to every known fact, "reſpecting the decompoſition of vegetables, than the "whole of the doctrine that has been ſo long implicitly "adopted reſpecting the formation of moſs, by means "of decayed ſpagnum, or any other decayed plant "whatever." In page 68, he aſſerts, "It is there-"fore impoſſible for any human being, who ſpends "but a thought on this ſubject, not to be ſatisfied, "that to whatever cauſe we are to aſcribe the origin "of moſs, it cannot be to that of the accumulation of "vegetables, which have grown on the ſurface, now "in a ſtate of decay."

The doctor, after playing off his artillery, with apparent ſucceſs, againſt ſome men of ſtraw, which he ſets up, concludes, (p. 70.) "Upon the whole, it ſeems "to be demonſtrated, that moſs cannot be formed of "vegetables in a decayed ſtate."

Having ſhown *negatively*, that moſs is not formed by "*depoſition*, *cryſtalization*, *congelation*, *exudation*," or "*accumulation*," of decayed animal or vegetable matter, he proceeds to ſhow *poſitively*, that it is itſelf a growing vegetable, *ſui generis*, (p. 68.) "It may be "produced by the gradual increment of a vegetable "matter ſtill alive, and in a growing ſtate, and noth-"ing elſe." P. 79. he ſays, "Moſs is, in effect, a "vegetable matter, *ſui generis*, which is produced in "proper circumſtances, though we are yet ignorant *

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* The mode of reaſoning in this paſſage, is very different from that uſed in page 63, above quoted; though the propoſition above is far from being near ſo clear as the fact there ſtated. There the

"of what theſe circumſtances are, and which continues to increaſe to an immenſe magnitude, and to live to an indefinite age."

In ſupport of this fanciful theory, Dr. Anderſon diſplays no little learning, and ſtill more ingenuity; but theſe ſeem to me to be perverted in defence of a favourite whim. In page 74, he inſinuates that this ſtrange plant does not grow at the top like other vegetables, but from the root, like the hairs of a man's beard.

He makes a whimſical diſtinction between what he is pleaſed to term *dead moſs*, which, he ſays, covers the ſurface, from 6 inches, to two feet deep, and *quick moſs*, which comprehends all below. The propriety of this diſtinction is doubtful. High moſs and low moſs, old moſs and new moſs, ſeem to me to be as well calculated to convey a proper idea of the diſtinction he makes. But, if quick and dead are the names uſed, they ought certainly to be reverſed. The moſs on the ſurface, on which vegetation is ſupported, ſhould rather be termed quick moſs, than the cold torpid moſs below it, on which neither animal nor vegetable life can be ſupported. If the term dead moſs be at all proper, it falls to be conferred on the torpid moſs below the ſoil. The doctor ſeems to exult in an after diſcovery, that no living animal is

doctor declaims againſt a well known fact, as an inſult to reaſon, and every known law in nature, merely becauſe he either is, or pretends to be, ignorant of the cauſes which produce it. But when he wiſhes to introduce his heterogeneous plant, the mere creature of his own fancy, he is not afraid to record a fact which he cannot account for, and moſs muſt be a vegetable *ſui generis*, though he is ignorant of the cauſes which produce it.

ever found in what he calls quick moſs. But where did ever any man ſee, or expect to ſee, either vegetables, or living animals, below the depth of the ſoil? In a clay, for inſtance, where the ſoil has not been deepened by culture, did the doctor ever ſee vegetables, or animals, more than two feet below the ſurface?

But without tracing through all its ramifications, this heterogeneous vegetable, which exiſts only in Dr. Anderſon's fertile imagination, I beg leave to repeat, that moſs does not appear to me, to be either a primitive earth, the production of the univerſal deluge, nor a living or growing vegetable, *ſui generis*.

I humbly conceive, that moſs is nothing elſe than a vaſt collection of inert, and partly decayed aquatic vegetable matter, firſt begun to be formed over fallen wood, or from the roots and ſtems of aquatic herbaceous plants, in moiſt, humid, and cold ſituations.

That vegetable matter being preſerved from complete decay, and even from much diminution in bulk, by certain antiſeptic qualities, which nature has conferred upon ſuch ſubſtance, in cold and damp ſituations, it has accumulated to that vaſt bulk we now ſee; and where nothing intervenes to retard, or interrupt its growth, it is every where faſt increaſing. The growth and nouriſhment of theſe vegetables from which moſs is formed "are promoted by atmoſpheric air, by the decompoſition of water, and by the calcareous matter held in ſolution in moſt water." (Earl of Dundonald.)

To render the true theory of moſs plain to the moſt ſimple, as well as to refute the fanciful theories that have been mentioned, it is proper to obſerve, that all the hiſtorians, ancient and modern, who have treated of the earlier parts of our hiſtory, agree, that when the Romans invaded Britain, a very conſiderable part of the iſland was then covered with growing wood. Wood then prevailed to ſuch an extent, that the Romans termed Britain, " *Horrida Sylves.*" Woods covered ſometimes a whole county. The *foreſt Anderida* was one hundred miles long, and 30 miles broad; and the *Sylva Caledonia*, was much more extenſive. I cannot better deſcribe the aſpect of Scotland, in ancient times, than by quoting the words of Mr. Heron. " In the commencement of the firſt " periods of its hiſtory, the country of Scotland was " univerſally overgrown with wood, except on the " very verge of the ſhores; on the brinks of ſome " parts in the courſe of ſome of its rivers; on " the clifts of its rocks, deſtitute of ſoil, and unfit to " nouriſh vegetation; on ſome low lying tracts, where " the ſtagnation of the waters, the decay of trees, and " other vegetables, had already formed moraſſes; and " in a few narrow ſpots, here and there, where the " natives had, perhaps, felled a tree to make room for " a hut, or to uſe it for domeſtic purpoſes."

Thoſe immenſe foreſts, which covered and beautified Scotland, no more exiſt; and large and deep moſſes now cover them, and the ſoil on which they were reared. The roots of the ſtately trees which compoſed theſe foreſts, are ſtill to be found in the very poſition in which they grew. The trees alſo lie near; but immenſe loads of peat-earth have grown over the whole.

A complete hiſtory of the overthrow of theſe extenſive foreſts, is not now attainable. Nature as well as art, is armed with powers ſufficient to overthrow every plant, as well as every living creature. The ſtately oak, " the monarch of the wood," the beauty and pride of the vegetable kingdom, is, in ſpite of all his moorings, ſometimes overthrown by the angry tempeſt. If he eſcapes that cataſtrophe, he is at laſt conquered by all-ſubduing time. If a breach is once made in a foreſt, the whole may ſoon be overthrown by the winds. As trees growing in a thicket ſhelter each other, they riſe high, and do not put out ſo many roots, as a ſingle tree does, which grows in an expoſed ſituation; ſo that if a breach is once made, the whole may eaſily be overthrown. That ſome parts of theſe foreſts were thus overturned by hurricanes, at different periods, is highly probable. Though I do not imagine that many of our foreſts have been overturned in that way.

Some who have written on moſs, pretend to have diſcovered, that the tops of foſſil trees, in the weſtern parts of Scotland, are always found pointing to the north-eaſt, and from this they conclude, that the foreſts have been overthrown by the ſouth-weſt gales, which are always the moſt powerful in that part of the iſland. The venerable Dr. Walker, has, among others, gone into this error; Prize Eſſay, pages 18 and 19, he ſays; " We find in them (moſſes) large full " grown trees, but always evidently broken over, and " without the bark. In remote times, when timber " was of no value, the trees remained to the very laſt " ſtage of decay, when they were thrown down by " the winds. Trees found in peat ſtrata, generally lie " one way, or in the ſame direction; a preſumption " that they have been blown over by the ſame wind. " In the Locher moſs, and other extenſive moſſes in

" the weſt of Scotland, the trees all lie with their tops " directed to the north and north-eaſt. And it is " well known, that all the great ſtorms of wind, on " that ſide the iſland, come from the ſouth and ſouth-" weſt. But he adds, that in Holland, where the ſtrongeſt gales proceed from the north-weſt, the foſſil trees point to the ſouth-eaſt.

Had Dr. Walker duly examined foſſil wood himſelf, he would have found trees lying with their tops in every direction. I have carefully ſurveyed many moſſes, in all the ſouthern and weſtern counties of Scotland, without being able to ſay towards which point of the compaſs the greateſt number of trees had their tops pointed. I have ſeen ſome trees that had evidently been broken, and a few with their roots adhering, which ſeemed to indicate that they had been overthrown by the force of the winds. But theſe inſtances are ſo rare in the moſſes I have ſeen, and the roots of the trees in their natural poſition, ſo numerous, that I am confident the woods have, for the moſt part, been thrown down by the hand of man. The only trees in the weſtern moſſes that have not been cut, but ſeem to have been blown down by the winds, are the birches, and other aquatics, which have not grown in the original ſoil, but in the moſs, after it had riſen ſeveral feet high. Theſe are generally but ſtunted and ſhabby, and they are always found with the roots adhering. But moſt of the large trees that grew in the ſub-ſoil, will be found to have fallen by the axe.

Dr. Walker, in the paſſage above quoted, appears to me to be in an error as to the manner in which the woods were thrown down. He ſeems to think, that the whole trees of a foreſt would arrive at old age, and all of them die at one time. This is by no means the caſe. In a foreſt, as in animal life, one generation ſucceeds another. While one tree dies of old age, others are ſpringing up at its ſide, or from its roots; and the foreſt is a foreſt ſtill. One generation of trees ſucceedeth another, but the wood abideth for ever.

But ſuppoſing, as the writers on moſs generally aſſert, or inſinuate, that the whole trees of a foreſt, or even a large diſtrict of it, ſhould, like a crop of beans or of hemp, all come to maturity at one time, and all of them die together, I very much doubt if the formation of a moſs was at all likely to follow. If a wood ſhould die in that manner, the leaves and ſmall branches of the trees would drop off one after another; the larger branches would follow, and the trunk would in time crumble down. But when theſe fall by piece-meal, the ſmaller and leaſt durable parts of the tree would be diſſolved into earth, before the great and maſſy trunk of ſolid red-wood yielded to the force of the winds. In that caſe, a moſs was not nearly ſo likely to be formed, as when the wood was cut or overthrown, when the trees were entire, and in the vigour of their growth.

But, however that might turn out, I am confident that none of the moſſes in the weſt of Scotland have been formed in the way the learned doctor mentions. I have never found a moſs of any great extent, but I ſaw on the verges of it, where the moſs had been removed for fuel, or waſhed off by ſtreams of water, the roots of trees ſtill in the ground, with their fangs extended in the way they grew. Theſe are to me ſo many incontrovertible evidences, plain and viſible to all, that the trees which grew from theſe roots, did not die of old age, nor remain ſtanding after dead, till they loſt the bark, and arrived at "the very laſt ſtage of decay;" but it proves to a demonſtration, that theſe trees were overturned by the axe or the ſaw. Wood thrown down when in the vigour of its growth, before it is diminiſhed or impaired, is much more likely to occaſion that ſtagnation of air and water, which would change the ſtate of the herbage, and ultimately form a moſs, than if they had died, and crumbled down by piece-meal.

The venerable doctor is alſo in an error, as to the bark being allowed to fall off before the trees were overturned. If he had examined foſſil wood with attention, he would have found that much of it ſtill retained the bark, at leaſt on the under ſide. The bark will often be found adhering to the lower ſide of the tree, or viſible under it, when the upper ſide of the ſame tree is conſumed to near the centre. This proves that the tree was entire when it fell. The under ſide being ſoon enveloped in the moſs, was preſerved from corruption; while the upper ſide, being many years expoſed to the atmoſphere, before the moſs roſe over it, was much more injured. The doctor juſtly obſerves, that the lower, or nearer the ſubſoil, the tree is found, the more entire will it be. The trees that lie higher in the moſs, are always moſt conſumed. The reaſon is obvious, it muſt have been much longer before the moſs, which is but ſlow of growth, roſe ſo high, as completely to cover the whole tree, and ſhelter it from the diſſolving powers of the atmoſphere. Whenever any ſubſtance is completely enveloped in moſs, the progreſs of corruption will be arreſted.

From theſe conſiderations I conclude, that though ſome part of our ancient foreſts may have been laid down by hurricanes, and the ſtagnation created by the trees on the ground, have led to the formation of a moſs; yet that could not happen in the way Dr. Walker points out in the paſſage quoted, and it is chiefly to the operations of the axe, that the deſtruction of the foreſts are to be traced. Some part of theſe extenſive foreſts, were, no doubt, cut down to give greater ſcope to agriculture, or to extirpate the wolf, and other ferocious animals. But the greateſt havoc was made in the woods, to facilitate the operation of war; and the Romans were the chief agents in theſe cataſtrophies.

When our naked anceſtors were defeated, by the ſuperior proweſs and diſcipline of that martial people, they took ſhelter in the extenſive foreſts and with which the iſland ſo much abounded; and into which the victorious legions could not penetrate, in that order of battle, which alone could ſecure victory. The Britons often ſallied forth from theſe ſtrong holds, and, with the fury of tigers, attacked the Romans when off their guard. By ſuch ſudden and ſecret aſſaults, they ſecured much booty, and ſometimes cut off many of the Romans. But ſuch was the ardent ambition of that wonderful people for univerſal dominion, that they actually undertook the extraordinary taſk of cutting down the foreſts, and draining the lochs and ſwamps in Britain. The emperor *Severus*, in his laſt expedition to Scotland, about A. D. 207, and during the reign of Donald I. in Caledonia, gave orders to cut the whole foreſts in Scotland; and it is well known that large tracts of them were then laid low, and deep moſſes have ſince grown over the felled trees. *Severus* not only employed the Roman legions, and auxiliary troops then in Britain, but likewiſe ſuch of the natives as were completely under his control in that Herculean labour. Herodian mentions the fact, and Dion Caſſius ſays, that the emperor loſt, in that expedition, 50,000 ſoldiers, in cutting the woods of Britain, without facing the enemy.

Such woods as eſcaped the Roman axe, fell by thoſe of other warriors. John Duke of Lancaſter, ſet 24,000 axes to work at one time, to cut down the woods in Scotland.[*] The Danes are known to have cut down and burnt many woods in the northern parts of the iſland; the remains of which are frequently dug up, bearing the evident marks of fire.[†] King Robert Bruce, in his expedition againſt Cummin Earl of Buchan, deſtroyed ſome foreſts near Inverary, mentioned by Fordun, v. ii p 241. The trees then cut down, are ſtill found under the moſſes, which have ſince riſen over them to great depth.[‡] Theſe, with many other inſtances that might be mentioned, and ſtill more that have never been recorded, will ſerve to ſhow the terrible havoc to which the beautiful and extenſive foreſts of Scotland, have been devoted.

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[*] Vide Eveling on foreſt trees, page 565.

[†] In the pariſh of Applecroſs, trunks of trees are found under ground, on the hills and meadows, where no wood now grows. They bear the evident marks of having ſuffered by fire. Tradition reports, that the Danes burnt down the foreſts there, (Stat. vol. iii. p. 379.) The ſame account is given by the miniſter of Edzell, in the county of Forfar. Stat. vol. v. p. 103.

[‡] Stat. Account, vol. xv. page 144.

As this treatiſe was originally intended to make a part of another work, chiefly devoted to the improvements of the pariſhes on the Aven, I had a deſire to inquire into the time and manner in which the foreſts in that diſtrict were cut down; but my utmoſt reſearches have failed in diſcovering the period when that happened, or the circumſtances which led to that overthrow. That all the lands buried under moſſes, in that diſtrict, were formerly covered with growing woods, is clearly proved by the roots of the trees viſible under every moſs there, with their ſhoots firmly claſped into the earth where they grew. As it is well known that the Romans were frequently in that quarter; made a road through it from near Lanark to Ayrſhire, by Loudoun hill; as the veſſels of Roman bronze, already mentioned, were found under ſeveral feet of moſs near the line of that road; and as about 400 Roman coins of the emperors, from Auguſtus, down to the end of the third century, were, in June 1803, found hid in a glaſs bottle at Torefoot, in Strathaven pariſh, near that road, I am diſpoſed to believe, that the Romans had cut down ſome part of the woods in that diſtrict. It is probable, that the Romans would cut down the woods that grew near their famous road, to prevent their armies being ſurpriſed when travelling thereon.

It is evident, however, that it could only be a ſmall part of the woods on the Aven, that were ever cut down by the Romans. That thoſe on the upper parts of the diſtrict remained a growing foreſt, till about the twelfth or thirteenth centuries, will appear evident from the following conſiderations.

The upper parts of Avendale, which march with Ayrſhire, formed part of the foreſt of Selkirk, ſo often mentioned by our Scottiſh hiſtorians, between the 10th and the 14th centuries. That foreſt, extended from the county of Selkirk, to the town of Ayr, comprehending the upper parts of Ayrſhire, Clydeſdale, Peeblesſhire, &c. as far as Selkirk. Of courſe, the ſouthern and weſtern parts of the pariſh of Strathaven, and higher parts of Leſmahagow, muſt have formed part of that foreſt. Hemingford ſays, page 165. "*Devenerunt noetræ per medium foreſtæ de Selkirk, uſque ad caetellum de Are.*" And the learned Lord Hailes, in his Annals of Scotland, vol. i. page 260, ſays, "the foreſt of Selkirk appears to "have comprehended not only the tract now known "by that name, *but alſo the upper parts of Clydeſdale and* "*Ayrſhire.*" Many other authorities might be quoted, but theſe will ſuffice to ſhow, that the upper parts of Strathaven and Leſmahagow pariſhes, formed part of the foreſt of Selkirk. That this foreſt was in exiſtence in the 12th century, and ſince, is well known to all who are acquainted with the hiſtory of theſe periods.

That the weſtern parts of this foreſt, particularly what now forms the pariſhes of Sorn and Muirkirk, which march with Avendale, were a growing foreſt in the end of the the 12th century, is proved beyond all doubt, by a charter, granted by Walter the Grand, Steward of Scotland, to the Ciſtertian monks of Melroſe, in the year 1180. In that charter, the Steward conveys to the ſaid monks, in pure alms, for the health of his own ſoul, and thoſe of ſome of his relations, the lands of *Mauchlin*, &c. *with the whole paſture of my foreſt, as far as the marches of Douglas, Leſmahagow, and Glengivel.* The words of the charter are "*Per diviſas ſuas inter terram de Mauchlin et terram Gilberti, filii Richeri cum tota paſtura foreſtæ ſuæ uſque ad diviſas de Douglas, et Leſmahagow, et Glengivel.*"

The lands conveyed in that charter lying between Mauchlin, Douglas, Leſmahagow, and Glengivel, are what now forms the pariſhes of Sorn and Muirkirk, in the higher parts of the ſhire of Ayr. Douglas, Leſmahagow, and Glengivel, form part of Lanarkſhire, which was included in the foreſt of Selkirk, That theſe were a growing foreſt in the year 1180, will not be doubted by any one who reads the charter above quoted.

This fact may be alſo eſtabliſhed beyond a doubt, from the names of farms in that quarter. Though very few trees now grow in Muirkirk, or the upper end of Strathaven pariſhes, and though four-fifths of the whole ſurface in theſe quarters are now covered with moſs, yet the greateſt part of the lands is named by *wood*. In the pariſh of Muirkirk, three very large ſheep farms, each of them containing many hundreds of acres of moſs, are denominated Upper, Nether, and Mid, *Well-woods*. Other farms as large, and equally overrun with moſs, are likewiſe named from wood; as, *Aſhyburn*, *Harewood*, *Netherwood*, Middlefield in *Netherwood*, Lamingburn in *Netherwood*, Burnfoot of *Netherwood*, *Beblon Woodhall*, Waterhead in *Netherwood*, *Birklaw Aikler*, &c. The largeſt water in that pariſh, is termed the *Green-oak-water*, and ſeveral farms in its neighbourhood, now alſo covered with moſs, have the ſame name, as *Green-oak-mains*, *Green-oak-dyke*, &c. Beſides theſe, which are all large ſheep farms, we find many extenſive tracts or fields, parts of other farms, where the moſs has ariſen high above the timber, and where no trees now grow, ſtill named by *Wood*, or *Bank*, which in that part of the country bears the ſame meaning, ſuch as *Birkin-bank*, *Cow-bank*, *Trintle-hill-bank*, *Wood-hill*, *Wood-meadow*, *Woody-trough*, *Aiken-cleugh*, *Thorny-run*, *Thorny-hill*, *Saugh-buſh-hill*, *Birkin-runner*, *Gowk-thorn*, *Aſhy-hurſt*, &c.

When we turn our face towards the Aven, we find on the higher grounds, which made part of the foreſt of Selkirk, many farms and fields, on which ſcarcely a tree has grown for ſeveral centuries, and which are moſtly covered with moſs, ſtill named by *Wood* or *Bank*, which are ſynonymous terms. Some of theſe names are of Celtic etymology, but moſt of them are in the Saxon language. Of the former, we find ſeveral extenſive muir-farms, moſtly covered with moſs, denominated *Hair-ſhaws*, * *Hair-ſhaw-head*, *White-ſhaw*, *White-ſhaw-gate*, *Berkin-ſhaw*, *Shaw-head*, ſeveral *Shaw-touns*, and *Shawton-hills*, *Calder-water*, † *Calder-green*, *Calder-crooks*, *Calder-mill*, &c. In the Saxon tongue, we find on the ſouthern parts of Strathaven pariſh alone, where it marches with Muirkirk, *fourteen* farms, moſt of them of great extent, and where moſs covers the greateſt part of the ſurface, denominated *Lin-banks*, *Hawk-woods*, *Bank-end*, *Kirk-woods*, *Hazel-banks*, and *Aller-ſtocks*. We alſo find *Black-wood*,

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* *Shaw* is the Celtic word for wood.

† *Calder* is the Celtic word for *oak-wood*.

Nether-wood, *Wood-head*, ſeveral *Hazel-deans*, *Edle-wood*, *Over-wood*, &c.

Theſe prove, beyond all doubt, that the farms ſo named, were covered with growing wood, when the names they now bear were firſt conferred. No people could, in ſo many inſtances as have been mentioned, and in thouſands more * that might be pointed out, in all the counties of Scotland, denominate *moſſes*, by the name of *wood*, unleſs there had been reaſon for impoſing theſe names. Names conferred by a rude people, are generally much juſter, and much more deſcriptive of the thing named, than thoſe conferred by a people who have made greater progreſs in refinement. A ſavage people have but few words in their vocabulary. Our Celtic anceſtors were remarkable for giving names the moſt deſcriptive. Dr. Smith obſerves, that every thing in their religion was more clearly explained in the etymology of the name, than they can be in ours in a long theological lecture. The names of farms, hills, rivers, &c. in the Celtic tongue, never fail to convey a clear and correct deſcription of their ſituation or aſpect.

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* Similar names are to be found in many parts of Scotland, vide the Statiſtical Accounts paſſim. In the pariſh of Carnwath, which alſo lies on the line of the foreſt of Selkirk, many farms ſeem to have received their names from *wood*, which are now buried under *moſs;* ſuch as *Hare-wood*, or *Hart-wood*, *Gert-wood*, *Wood-ſide*, *Wood-end*, &c. Vide the ſurvey of Peebleſhire, by Rev. Mr. Finlater.

The foreſt of Paiſley, which, like thoſe on the Aven, exiſted in the 12th century, has ſince been, like them, laid low and overgrown with moſs. But the names it had before that change ſtill continue; as, *Wood-ſide*, *Oak-ſhaw-ſide*, *Oak-ſhaw-head*, *Lin-wood*, *Ful-wood*, *Birkin-head*, *Wood-head*, *Walking-ſhaw*, &c. In the charter of foundation of the monaſtery of Paiſley, the great Steward conveys to the monks the tithes of all the lands *below the foreſt of Paiſley*: the words of the charter are, "*Decemas de omnibus terras infra foreſtum ſuum de paſleto.*" In Prynn's collection, mention is made of "*John le Hunter, de la foreſte de paſles.*" As late as the years 1460, and 1524, the tenants of Dunſcaith-wood, in the vicinity of Paiſley, were bound by the Abbot, "To keep the wood or foreſt, and to "uphold or repair the dyke round the foreſt." This foreſt of Paiſley when entire, would communicate with the foreſt of Selkirk, ſituated at the ſources of the Aven. In ancient times, the woods extended, without much interruption, from Paiſley, through the higher parts of the ſhire of Renfrew, the marches of the ſhires of Ayr and Lanark, by Loudoun-hill, &c. and continued to near the ſhores of Galloway. The whole wood along that extenſive tract has been long ago cut down, and where it grew, deep moſſes now lie. This is probably the largeſt tract of moſs in Great Britain.

The wood ſtill to be ſeen in all theſe moſſes, and the roots of the trees in the ſubſoil, prove the exiſtence of the foreſts where the moſs now lies. As no doubt can remain that the preſent names were conferred when the woods were ſtanding, if we could only diſcover at what time theſe names were firſt given, we ſhould thereby be able to fix a period, *within which* the wood muſt have been growing, and the moſs not begun to be formed.

Such of the names as are of Celtic derivation afford no data on this head. But ſuch of them as are of Saxon, or Engliſh origin, could only be given after the introduction of theſe languages into this part of the kingdom. Indeed. a language muſt have come into general uſe, before farms and fields could be named by it. For names of ſuch places, in parts ſo remote, are not conferred in the language of the court; but by the moſt illiterate of the peaſantry, in the homely ſtyle of their mother-tongue, and always from ſomething the moſt ſtriking in their aſpect or ſituation.

The Engliſh language was firſt introduced into Scotland, by the Dano-Saxons, between the 9th and 11th centuries. But it did not become the general language of the country people, until after the conqueſt of Scotland by Edward I. near the end of the 13th century. It is no way probable, that the Engliſh language would be ſoon introduced into that remote diſtrict. The country is mountainous, barren, and but thinly inhabited. It is the extremity of two counties, which had for many centuries been peopled by two hoſtile nations; and on that account, it is probable, that a conſiderable tract next the march on both ſides, would remain uninhabited, till theſe nations were blended into one about the 9th century. Prior to the invaſion by the Romans, the *Novanti* inhabited Galloway and Ayrſhire, and the *Damni* occupied Clydeſdale. After the Romans abandoned the iſland, Galloway and Strathclyde continued, till the time of Kenneth M'Alpin, to be inhabited by two hoſtile nations, who waged terrible wars againſt each other. Both of theſe nations were Britons. The Saxons never obtained a footing in that part of Scotland, ſo that it was impoſſible the Saxon language could find its way into theſe remote parts, till after the conqueſt of Scotland by Edward I. in the end of the 13th century.

When I conſider that the muirs of Muirkirk, and higher parts of Avendale, formed part of the foreſt of Selkirk, which is well known to have exiſted in the 13th and 14th centuries; when I look at the charter by the Steward, quoted above; and when I find ſo large a proportion of the land in theſe regions ſtill named by *wood*, in the Saxon language; I am warranted to conclude, that the pariſhes of Sorn, Muirkirk, and the higher parts of Strathaven, Leſmahagow, Douglas, &c. now almoſt wholly covered with moſs, were all growing foreſts, at, and after, the end of the 12th century.

As to the preciſe time when the extenſive woods in theſe quarters were cut down, or by whom that great work was executed, I can offer no opinion. It is well known, that king Robert Bruce wandered for ſome time in that neighbourhood, with his army, after the battle of Loudoun-hill. But whether the Engliſh cut theſe woods after that period, or during their inroads under Baliol, in the unhappy reign of David Bruce, to prevent the Scots armies from flying again to ſuch a ſtrong hold; or if they were cut to extirpate the wolf, are matters on which I can form no conjecture.

However that may be, no doubt can be entertained, that the overthrow of theſe woods led to the formation of the moſſes, which now cover the greateſt part of the ſurface in that part of the country. What an unprofitable exchange! The growing wood would have ſheltered and greatly beautified the country; mended the climate, and proved a vaſt treaſure to the owners, and to the public; while the moſs which has riſen over it, is of little uſe as a ſoil, and has very injurious effects on the climate.

Whatever obſcurity may remain as to the time, or manner in which the wood was overthrown, the conſequences ariſing from it are well known. The formation of moſs is uniformly to be traced to the ſame cauſe, a vaſt accumulation of dead, and partly decayed aquatic plants, and the remains of gramineous vegetable matter, firſt begun to be formed over the deciduous parts of the foreſt trees, or other ligneous, or herbaceous ſubſtance; and having acquired an inſoluble or antiſeptic quality, which reſiſts, or, at leaſt, greatly retards putrefaction, it accumulates in courſe of time to an immenſe magnitude.

The moſt ſuperficial obſervers of the beautiful economy of nature, cannot fail to perceive, with wonder and delight, the infinite variety with which all her works abound. That wonderful variety is not more conſpicuous in any one thing, than in the extraordinary diverſity of vegetation, ſuited to every ſoil and climate. If the ſoil is rocky and barren, nature has provided ſucculent plants to grow upon and enrich it. If low and damp, an infinite number of moſſes (Muſci) and aquatic vegetables are prepared, ſuited to ſuch moiſt and humid ſituations. The ſandy deſerts have their particular plants; the waters, their lilies and pond-weeds. If the ground is only drained, theſe will diſappear, and more valuable graſſes will ſpring up. Even the cleaneſt ſtones or pieces of wood, when expoſed to the atmoſphere, will ſoon be covered with tribes of vegetables termed liverworts.

The extenſive plains and fields covered with felled trees, laid in every direction, with their branches, and perhaps their leaves, would, where not interrupted by cattle, or otherwiſe, certainly create a great ſtagnation of air and water. The herbage of the ſoil would riſe among the branches of the trees to a great height, for a ſeaſon or two, and would greatly increaſe that ſtagnation, till at laſt the current of air and water would be quite interrupted. Ruſhes, ſprits, bent-graſſes, and other aquatic plants would follow. Theſe in their turn would gradually give place to others, ſtill more adapted to cold and moiſt ſituations, till at laſt the whole tribe of moſs plants, infinite in number and variety, would envelop the wood, and ultimately riſe to a great height over it. For it will be ſhown in courſe, to be the nature of theſe plants to reſiſt putrefaction, and to continue little diminiſhed in bulk, long after they have ceaſed to grow.

Dr. Anderſon, in his attack on the received opinions of philoſophers as to the origin of moſs, would have us believe, that wood forms no conſtituent part of moſs, but is only accidentally found in it, as ſtones, or other ſubſtances, that may happen to be enveloped in that kind of earth. He ſays, (page 64.) "It is "true that wood is ſometimes found in moſs, and it "is equally true, that flies are found in amber; but "does it from hence follow, that amber is produced "from dead flies?" In page 65th, he adds, "From "the accidental circumſtance then of wood being "ſometimes found in moſs, nothing elſe can be inferred, than that moſs, during the progreſs of its "growth, has enveloped trees, as it does ſtones, or "any thing elſe it might meet with in its progreſs."

He avers, that he has ſeen many thouſands of cart-loads of moſs removed to the clay, without the leaſt veſtige of wood being found. He aſſerts, that not more than a tree or two have been found in each acre of Kincardine moſs, which has been dug up and floated off by water; and he thinks, there can be no trees under the moſs of Cree, or thoſe in the iſland of Lewis. But the doctor is far from being correct in point of fact, in what he there ſo roundly aſſerts.

The moſs of Kincardine forms a part of that extenſive tract of moſs, ſituated on both ſides the Forth, above Stirling, ſo frequently noticed by travellers and writers on agriculture. The intelligent Dr. Robertſon gives an accurate deſcription of that moſs, and the mode of clearing it off, in his very valuable ſurvey of Perthſhire. But ſo far from corroborating Dr. Anderſon's account of the quantity of wood found under it, he ſays, the ſurface of the clay "is "every where thickly covered with trees, chiefly "oak and birch, many of them of great ſize. "They are found lying in all directions beſide their "roots, which ſtill continue firm in the ground, in "their natural poſition; and from impreſſions ſtill "viſible, it is evident they have been cut with an "axe, or ſome ſimilar inſtrument. When the moſs "is removed, the clay is found to be encumbered with "the roots of different kinds of trees, ſtanding as "they grew, often very large; their trunks are alſo "frequently lying beſide them," (page 494.) In pages 24th and 25th, the ſame author gives a ſimilar account of wood being found under Moſs Flender, and other moſſes. To an authority ſo highly reſpectable, it is ſcarcely neceſſary for me to add, that the account given of Kincardine moſs, by Dr. Anderſon, induced me to ſurvey it of new, in April 1804, merely to aſcertain the quantity of wood uſually found under it; and I am well authoriſed to ſtate, that an immenſe quantity of wood has been found under every part of it which has been dug up. Except near the verges of the moſs, not fewer than a thouſand trees, of different ſizes, are uſually found in every acre. The innumerable roots of theſe trees, claſping the earth in the manner in which they grew, are very great encumberances to the cultivators, and require an immenſe labour to remove them after the moſs has been floated off, and the large trunks of the trees removed.

The miniſter of Kippen, in the Statiſtical Account of his pariſh, vol. xviii. p. 317, gives an account ſimilar to that of Dr. Robertſon, as to the quantity of wood found under the moſſes, on that part of the Forth. He alſo mentions, that a Roman road, formed of wood, has been diſcovered under that moſs. A ſimilar road has been found under the moſs of Logan. All theſe moſſes are ſituated on the ſide of the Forth, and near that of Kincardine. It is ſurpriſing that Dr. Anderſon ſhould have written at ſuch random.

The doctor does not inform us, where it was he ſaw ſo many thouſands of cart-loads of peat removed, without finding a ſingle tree under it. It ſurely could not be in the ſhires of Perth and Aberdeen, where he is ſo much acquainted. For Mr. Gregg, miniſter of Petſligo, in Aberdeenſhire, ſays, "The greateſt part "of the county muſt have been once covered with "wood, as appears from the roots of very large oaks "ſtill exiſting in the moſſes." Stat. Account, vol. v. p. 98. The miniſter of Inch, in the ſame county, ſays, the hills abound with moſſes, and, "in the "moſſes of theſe hills, very large trees are frequently "dug up." Stat. Account, vol. xvii. p. 483.

The miniſter of Langſide, in Aberdeenſhire, ſays, "It is very evident, that Buchan was, ſome centuries "ago, remarkably well wooded. Its extenſive moſſes "contains the remains of very magnificent trees."

Stat. Account, vol. xv. p. 291. The miniſter of Kintore, in Aberdeenſhire, ſays, " The moſſes abound " with fir; and oak roots, very large, are found in the " neighbourhood." Stat. Account, vol. xiii. p. 90. Similar accounts are given by the miniſters of Peterhead, Saintfergus, Logierait, and others in that quarter of Scotland.

But Dr. Anderſon himſelf atteſts the fact. In pages 13th and 14th of his treatiſe, he informs us, that a large moſs, in the pariſh of Foveran, in the ſhire of Aberdeen, named the moſs of South Farthing, has been dug up for fuel, and the ſubſoil, which he ſays is clay, is much encumbered with roots and ſtumps of many very large oak trees, ſtanding as they grew, ſome of them not leſs than ſix or eight feet, or more, in diameter; and in many places ſo cloſe together, as not to be more than three or four diameters diſtant from each other. The doctor adds, " *Many inſtances* " *of the ſame kind I could condeſcend upon.*"

Dr. Anderſon is not more accurate with regard to what he aſſerts, as to the moſs of Cree. I have alſo ſurveyed that moſs, and can ſay with certainty, that it contains an immenſe number of very large trees. Mr. Heron, in his Tour, vol. ii. page 248. mentions, that wherever the moſs of Cree is cut up, large trunks of trees are found, *laid extremely thick*, and moſt of them undecayed, which diſcovers the origin of the moſs. The tract this moſs now occupies, he obſerves, has made a wide foreſt. The trees are oak Scotch pines, * birch and others; and he thinks they have been overthrown when in full growth.

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* Dr. Walker, in the valuable Eſſay quoted above, ſays, (p. 15) " It does not appear, from any monument extant, that the Scotch " pine has ever grown wild in the lower parts of Scotland, ſouth " of the Forth. No pines are found in moſſes ſouth of the Forth."

Dr. Walker, in page 14th of his Eſſay, ſays, "The "Locher moſs in Dumfriesſhire, the moſs of Cree in "Galloway, and Moſs Flender in Perthſhire, are all "ſituated near the level of the ſea, and in the beſt "climate in Scotland for the growth of a tree. Ac"cordingly in theſe we find trunks of a large ſize." In a foot-note in page 7th, he ſays, "Though Lewis "is now entirely deſtitute of timber, there are large "trunks of elder, birch, and eſpecially of Scotch fir, "found in its extenſive moſſes."

If Dr. Anderſon had been at as much pains to aſcertain facts, as he has taken to vend his whims and fancies, he might have diſcovered that wood abounds in almoſt every moſs in Scotland. I have examined hundreds of moſſes, and I never yet found one of any conſiderable depth, but I found wood, * more or leſs,

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The reverend doctor has not been correctly informed on this ſubject. Pine wood is more general upon the north, than it is on the ſouth ſide of the Forth. But it abounds in the moſſes on both ſides of that river. It is found in the moſſes in Linlithgowſhire, Lanarkſhire, and in Galloway. Some of the pine trees found under moſs, about Slamannan in Linlithgowſhire, are in ſuch a ſtate of preſervation, that they are uſed for roofing and flooring houſes, and even for cabinet work. Some of theſe trees have been ſold at near four pounds ſterling. They are ſo remarkably inflammable, that they are ſplit into ſmall pieces, and uſed for candle. They are alſo ſplit into into reeds, and ropes made of them. Fir teathers are, in ſome parts of the Highlands, ſold at every country fair.

* I do not conſider *bent-moſs*, (to be afterwards deſcribed) as any exception. For though trees are not to be met with in every part of that ſort of moſs; yet as it is always found in the vicinity of deeper moſs, in which the foſſil wood abounds; I am inclined to conſider bent-moſs, as only an appendage of the deeper moſs formed over the

under ſome part of it: nor have I ever met with a man who could ſay, he had ever ſeen, in Scotland, a moſs without wood under it, Dr. Anderſon only excepted. The numerous and very reſpectable authorities which I have quoted, are certainly ſufficient to prove, that wood abounds in all our moſſes. Theſe authors are indeed all philoſophers; and it is againſt the generally received opinions of ſuch that Dr. Anderſon has declared war as to the origin of moſs. But however the doctor may have thought proper to treat *opinions*, I think he ſhould have paid a due reſpect to *facts*. It is much better to form opinions from well authenticated facts, than to diſtort facts to ſupport whimſical opinions.

Moſs aſſumes different appearances, according to the ſtate in which it is kept, and particularly as the ſoil happens to be more or leſs moiſt when it is formed. The damper the ſoil is kept when the moſs is growing, the lighter, opener, and leſs valuable will the moſs be; but where the ſoil is kept drier, the moſs, though it does not grow ſo faſt, will be much more ſolid, and more valuable.

The various appearances that moſs aſſumes from that circumſtance, has induced ſome to conſider theſe as ſo many different kinds of moſs. Dr. Walker, in his Eſſay already quoted, has divided peat-earth into no fewer than ſeven different kinds, viz. *Wood-peat*, *Flaw-peat*, *Heath-peat*, *Gramineous-peat*, *Inch-peat*, *Conſumed-peat*, *and Water-born-peat*. But with all defer-

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wood, and that the overthrow of the wood has been the primary cauſe of both kinds. The proſtrate wood has given riſe to the deep moſs that covers it, and that deep moſs has led to the formation of the bent-moſs in its vicinity.

ence to the learned profeſſor, I cannot perceive the propriety of ſo many diſtinctions. If theſe diſtinctions are meant to apply to the origin of moſs, as they certainly are, they appear to me to be by far too numerous; but if they apply to the ſtate that moſs is found in, they are by far too few. Of theſe, two only appear to be applicable.

Peat that has begun to be formed over the ruins of a wood, may not improperly be termed *wood-peat*. And certainly the greateſt part of moſs, if not the whole, may be traced to that origin.

Gramineous peat too, may be a proper term to diſtinguiſh that ſort of peat or turf, ſo common in Holland, and which is to be found in ſome lochs, pools, and extremely wet places in this country. That ſpecies of peat is, as Dr. Walker obſerves, formed from the decay of ruſhes, reeds, and other aquatic plants, which have ſtrong and bulky perennial roots; ſuch as bulruſhes, bog-ruſhes, common-ruſhes, reeds, reed-graſs, &c. The deſcription given by Dr. Walker of this kind of turf is very correct: but as it is only found in a few lochs, ſtanks, or ſtanding pools of water, it ſcarcely merits notice.

The deſcription given by him of *flow*, or, as he thinks it ſhould be termed, *flaw-moſs*, is perfectly correct. That kind of moſs, is juſt the light, ſpungy ſubſtance he deſcribes it; and it is formed from the bog-moſs, gold-ellocks, and ſuch like plants, as he mentions. But, as Dr. Walker alſo obſerves, it is generally found ſpread on the top of *wood-peat*, and therefore, in my opinion, it does not fall to be conſidered as a different ſpecies of moſs, or proceeding from a different origin. It is merely the ſame ſubſtance, rendered more open, light, and ſpungy, by the ſurface of the moſs having been laid under a greater degree of moiſture. Wherever the ſurface of a moſs is dry, the herbage it produces is richer and leſs bulky, than when the ſurface of the moſs is wet. Deer-hair, bent-graſs, and ſuch like, grow upon a moſs ſoil, when it is laid dry in any tolerable degree. Theſe graſſes do not riſe ſo bulky as the ſphagnum, which grows in the damp moſſes; and as putrefaction makes much greater progreſs on the dry moſs, it does not accumulate ſo faſt on the ſurface, and is much more inflammable than the other. But whenever the water-courſes are obſtructed, and a greater quantity of moiſture kept on the ſurface of the moſs; the richer herbage ceaſes to grow, and the ſphagnum puluſtre ſprings up. This plant when growing, and after it has ceaſed to grow, very much reſembles wet fog, or wet tow. It reſiſts (eſpecially when it remains ſoaked in water) putrefaction, and remains longer unimpared in its form, than any other moſs. Its reeds and fibres may be traced ſeveral feet below the ſurface. Even when the peat has been dried, it is eaſy, by rubbing it in your hand, to ſeparate the plants from each other like fog. Flaw-moſs is not near ſo valuable, either for fuel, or a ſoil, as the moſs compoſed of richer herbage, or at a more advanced ſtage of putrefaction. Still, however, I cannot conſider this as a ſpecies of moſs different from the wood peat, over which it is formed, merely by the ſoil being laid under a greater quantity of water. Theſe, as well as what Dr. Walker terms conſumed peat, are frequently found in alternate courſes on the ſame moſs, ſtratum ſuper ſtratum. As often as a change is effected in the humidity of the ſurface, during the growth of the moſs, ſo often will flaw-moſs, and conſumed moſs, be found in alternate ſtrata. Hence are the ſeveral courſes of black and brown, of foggy and decayed, of inflammable and leſs inflammable moſs, ſo often found in the ſame peat breaſt, to be accounted for.

Theſe ſtrata do not often extend far in a regular courſe, but are frequently changed and interrupted every few yards. The reaſon is obvious. If a moſs were completely level, and the change in the humidity of the ſoil extended equally over the whole of its ſurface, the different ſtrata would be quite regular over the moſs. But as the changes in the ſtate of the moiſture are generally occaſioned by accident, and the ſurface of the moſs ſeldom even and level, the obſtructions of the water would only be partial. While one part was laid under water, another would be laid drier, which accounts for the interruptions in the ſtrata.

Heather-peat does not in my opinion exiſt. Heather, indeed, grows on moſs almoſt in every ſtate in which we find it. That plant too, when it yields to all-ſubduing time, will at laſt go into decay, and its remains will ultimately mix with the ſoil. But the quantity of earth produced from decayed heather, is in no caſe ſo great as to merit the leaſt notice; much leſs to give name to the whole body of moſs-earth. Heather is extremely ſlow of growth, and as ſlow of decay. I ſuppoſe it may be almoſt a hundred years, from the time a ſhrub of heather begins to grow, before it is reduced to earth; and when it is ſo reduced, it is ſo extremely ſmall in bulk, as to be almoſt imperceptible. I do not believe that the thouſandth part of any moſs was ever compoſed of decayed heather.

We ſee that heather has often grown uninterrupted, upon every deſcription of ſoil, for many centuries; probably ever ſince theſe ſoils began to bear any plants, yet no moſs has begun to be formed. Frequently the ſoil covered with heather, is almoſt entirely diveſted of vegetable ſubſtance. The heather baniſhes other plants, and it is ſo ſlow of growth and of decay, that it can yield extremely little vegetable matter to the ſoil. No ſoil will be found to be poorer than that which is covered with heather.

Inch-peat, it ſeems, is only found in one particular place in Lancaſhire, and Dr. Walker ſays, he has only mentioned it for its ſingularity. Its uncommon inflammability is owing to its being mixed with a foſſil petroleum. But it does not appear to me, that ſuch an accidental mixture, ſhould warrant the peat being ranked as a different kind of moſs. Springs from below, ſtreams of water above, and many different accidents, may throw a mixture of other ſubſtances into the moſs; and if all ſuch are to be regarded as different kinds of moſs, we ſhall find not only ſeven, but ſeventy times ſeven.

Conſumed-peat, as deſcribed by Dr. Walker, has no claim to be ranked as a different ſpecies of moſs, but is only moſs in a more advanced ſtate of putrefaction. Some part of every moſs is further advanced in corruption than others; that neareſt the bottom, where the moſs has been kept in nearly the ſame ſtate of humidity, will be always the moſt putrid, and of courſe the moſt inflammable. But as well might we conſider wet moſs and dry moſs, or thick moſs and thin moſs, as ſo many different kinds.

Waterborn-peat ſeems to me another unneceſſary diſtinction. Moſs may be removed by other means beſides water. The winds remove it when dry; ſhovels, barrows, carts, &c. are ſometimes uſed to tranſport moſs; yet we do not hear of the moſs ſo removed, being conſidered as ſo many different kinds of moſs. Nobody talks of ſhovel-born-moſs, barrow-born-moſs, cart-born-moſs, though all of them ſeem to me to have an equal claim, as that which water has removed from one place to another.

Bent-moſs, which ſeems to have eſcaped the enlightened naturaliſt in his arrangement, appears to me to be of much greater importance, than the whole laſt ſix which are ranked in his diviſion. If any ſpecies of moſs can be traced to another origin than the overthrow of the foreſts, it muſt be that of *bent-moſs*. Gramineous peat-earth, (or *turf* as it ſhould be termed,) cannot be traced to wood for its origin; but as this kind of moſs is only to be found in Scotland, in a few lochs and ſtanks, it does not merit much notice. But *bent-moſs* is a matter of much greater importance. It covers an immenſe extent of ſurface, and either as fuel, manure, paſture, or a manured ſoil, it is of much greater value than any other kind of moſs. It never covers the ground to ſo great a depth, as the wood or flaw-moſs. It is often only three or four inches, and ſeldom more than 18 or 20 inches deep. This is by far the moſt ſolid of all moſs, and is always covered with a bulky crop of coarſe herbage, which makes a tolerable paſture. As a fuel, *bent-moſs* is more ſolid, blacker in colour, more adheſive, either when wet, or when dry, much more inflammable, and far more durable than any other moſs.

Some have imagined, that no wood is ever found under this deſcription of moſs, and from that they conclude, that the growth of it has not proceeded from the overthrow of the foreſts. I am much inclined to differ in opinion from thoſe who think ſo. It is not true, that no wood is ever found under *bent-moſs*. I have ſeen many large trees dug from under it; and the remains of bruſh-wood are generally perceptible under *bent-moſs*. It is never found in plain level ground, but on the ſides of hills, or that which has conſiderable declivity.

Though trees had originally grown in ſuch ſituations, and been thrown down with the reſt of the foreſts, the great declivity of the ground, would prevent that ſtagnation of air and water, ſo neceſſary to form a deep moſs; and if the moſs did not riſe ſpeedily to cover the wood, and ſhelter it from the operations of the weather, it would, in the courſe of a century, or ſo, be totally rotted into earth. I obſerve, that in the hilly parts of the weſtern counties of Scotland, where moſs very much abounds, the ſouth-weſt ſides of the hills, where the ſtorm beats hardeſt, are, where very ſteep, and bare of ſoil, entirely free of moſs-earth; and where the declivity is more gradual, and the original ſoil deeper, *bent-moſs* prevails. But deep moſs is only found in places more level, or on the eaſt ſides of the hills, where the wood, being leſs expoſed to the winds and ſtorms, has grown more luxuriant, and where the moſs, being better ſheltered, riſes faſter.

The *bent-moſs* is evidently compoſed of the leaves, roots, and ſtems of bent-graſſes, ruſhes, ſprits, and other coarſe aquatic herbage peculiar to ſituations that are cold, damp, and much expoſed; and which under ſuch circumſtances are always found in a partial ſtate of decay. As graſſes of that deſcription do not ſeem to be any way connected with the ruins of wood, many have concluded, that *bent-moſs* muſt have proceeded from ſome other cauſe than the overthrow of the foreſts. I am of opinion, however, that this, as well as the flaw-moſs, proceeds indirectly at leaſt from fallen wood. On expoſed ſituations, where the ſoil was ſhallow, the wood would probably be ſtunted, and leſs bulky, than that which grew from a deeper ſoil, and more ſheltered ſituation. From that circumſtance, and the declivity of the ground where the felled trees were laid, the ſtagnation of air and moiſture could not be near ſo great, as where a much greater quantity of timber had been tumbled. But though the wood was too ſcanty to form ſpeedily a deep flaw-moſs, yet it might be ſufficient to change the herbage into the coarſer ſorts of aquatic graſſes that compoſe bent-moſs. The richer herbage being once baniſhed, and the aquatics introduced, the accumulation of *bent-moſs* from their roots and ſtems, under a ſlow decay, would gradually follow.

Even where no wood had been laid on the particular ſpot of ground, the origin of the *bent-moſs* may ſtill be traced to the overthrow of wood. The huge bodies of dead, damp, chilling moſs, formed over the proſtrate wood, and the blaſting damps, and cold, nipping, froſty vapours, which proceed from ſuch maſſes of torpid moſs, would ſoon check the growth of every rich and ſucculent graſs in their vicinity, render the ſoil moiſt, and gradually introduce the aquatic herbage. Theſe coarſe graſſes being leſs palatable, would remain uneaten by cattle; and in proportion to the degree of cold, and the humidity of the ſoil, the leaves, ſtems, and roots of theſe graſſes would reſiſt putrefaction, until moſs-earth began to be formed over the original ſoil. A damp ſoil, and chilling atmoſphere, always baniſhes the poa-graſſes, and raiſes a coarſe and unpalatable herbage. Theſe coarſe aquatic graſſes do not yield to putrefaction in the manner that rich and ſweet herbage does, but remain inſoluble, and but partially diſſolved. From that very cauſe, the ſoil is deprived of a principal part of the food of next crop, which on that account muſt become gradually poorer, and muſt of courſe yield a worſe and coarſer crop from year to year. What remains unconſumed of the former crops being torpid, cold, damp, and inſoluble, inſtead of promoting, greatly retards the growth of future crops. As that half decayed ſubſtance accumulates on the ſoil, the graſſes become gradually coarſer, the ſoil more humid, and the cold more nipping. All theſe evils ſerve to increaſe each other. The cold increaſes the quantity of half decayed vegetable matter on the ſoil, and that matter increaſes the cold and the damp, till moſs once begun, increaſes in depth, and extent of ſurface.

Moſs plants, like all other vegetables, are veſted with powers to multiply and extend themſelves over the face of the earth. The command to be fruitful and repleniſh the earth, was not confined to the human ſpecies, but evidently extends to every ſubject of the animal and vegetable kingdoms of nature; and to do ſo, all of them are furniſhed with ample powers. Moſs plants not only propagate their ſpecies by diſperſing their ſeeds, or extending their roots; but even when they have ceaſed to grow, they accumulate on the ſoil in a torpid ſtate, and by throwing out their chilling vapours, blaſt the richeſt herbage near them, and thereby extend their own ſpecies over a larger extent of ſurface. It is to this diſpoſition or quality which nature has conferred on moſs, that the growth of *bent-moſs*, in the neighbourhood of large and deep moſſes, is to be attributed. And as theſe deep moſſes have uniformly ariſen over proſtrate wood, I conclude, that the origin of all moſs, bent, flaw, or whatever (lake-turf only excepted,) may be traced, directly or indirectly, to the overthrow of the foreſts. The deep moſſes are formed immediately from the tumbled wood which we always find under them; and even where no wood has ever lain under the moſs, it will be found to have been formed indirectly from the ſame cauſe. The wood formed the deep moſs, and the chilling froſts and vapours iſſuing from it, have formed the bent-moſſes in its vicinity.

As moſs is found to be of various depth, ſome have conjectured that its age was equally various. But the age and depth of moſs are matters no way connected with each other.

The depth of the moſs ſtratum is not regulated by the age of the moſs, but by the rapidity of its growth; and the rapidity of its growth is governed by the ſtate of the atmoſphere, and the degree of humidity in which the ſoil is kept. Cold, and ſtagnation of air and water, muſt prevail to a certain extent, before moſs can begin to be formed over the ſurface, and its progreſs and accumulation afterwards will ever be regulated by theſe circumſtances; the degree of cold and moiſture.

That a certain degree of cold is requiſite to the formation and preſervation of moſs, is fully proved from this circumſtance, that none of that ſubſtance is found in the warm latitudes. Even in thoſe regions where it does accumulate, it will always be found to be thinner as the climate becomes warmer, till it ceaſes to exiſt beyond a certain latitude. It is ſeldom found beyond the 35° of the equator; at any rate moſſes are not found within the tropics. The reaſon is obvious, the warmer climates produce richer and more luxuriant herbage, and theſe from their greater luxuriance, yield more readily to putrefaction, than the coarſe herbage that grows in a cold region, and in a damp ſoil. The greater degree of heat accelerates the putrefaction and decompoſition of the moſs.

Every perſon who has paid the leaſt attention to theſe matters, muſt have ſeen, that the more luxuriant the graſs has grown, the more rapid will be its diſſolution by putrefaction. A ſheaf of fat graſs, which has grown in the vicinity of the dunghill, will be completely diſſolved by putrefaction, in the tenth part of the time that would reduce the ſame quantity of benty-graſs, cut from a damp place, on the ſummit of a black mountain. Any ſubſtance capable of being reduced by corruption, will be much ſooner, and more completely diſſolved in a warm climate, than it would be in the cold regions of the north. Theſe general laws of nature, ſo obvious to all, will be found to apply to moſs, as well as to other vegetable ſubſtance.

It is very juſtly obſerved by Dr. Walker, that peat-earth is found in all the temperate and cold climates, in both hemiſpheres, for there the heat of the climate is not ſufficient to carry on the putrefactive fermentation to its utmoſt extent. He adds, "we find a remarkable difference in the putrefaction of peat, "from the ſmaller viciſſitudes of heat and cold in our "climates. At the ſame level above the ſea, the "peat is every where more conſumed in the ſouth of "England, than in the north of Scotland. The "natural conſequence of a warmer climate. In peat-"moſſes, in the lower parts of Scotland, the putre-"faction is always more advanced, and the peat more "conſumed, than in the higher parts of the country, "where greater cold prevails." Page 24th.

That the progreſs of the putrid fermentation, will be more rapid under the ſame circumſtances, in a warm than in a cold climate, is beyond all doubt. I cannot, however, on that account admit, that the deepeſt ſtrata of moſs, are thoſe ſituated neareſt the level of the ſea. Dr. Walker aſſerts, (p. 15.) "It "is alſo to be remarked, that the deepeſt ſtrata of "peat, are thoſe which are placed neareſt the level of "the ſea; whereas thoſe at a greater height are com-"paratively thin. *This naturally reſults from a more "luxuriant vegetation of trees and plants in the one caſe "than in the other.*" In pages 22d and 23d, the ſame author remarks, that, "In Ireland its greateſt depth "is ſaid to be twenty feet. This may in part be ow-"ing to the water-born peat, with which the deepeſt "drains and ditches in that country are ſoon filled "up. Yet it is reaſonable to ſuppoſe, what appears "to be the caſe, that the natural peat ſtratum in Ire-

"land is, in general, deeper than it is with us, *from a*
"*greater mildneſs of climate, and a greater luxuriance in*
"*vegetation.*"

There ſeems to me to be at leaſt an apparent contradiction in the paſſages quoted, and which I cannot perceive to be explained in that Eſſay. Putrefaction more advanced, and the peat more conſumed, in warm and low ſituations, and yet the moſs ſtrata deeper there than in higher and colder regions, is a phenomenon that requires to be explained. Dr. Walker, indeed, tells us, that the great increaſe of the moſs in low and warm ſituations, near the coaſt in Britain and Ireland, is owing to a greater mildneſs in the climate, and a more luxuriant vegetation. But if theſe were the cauſes of the increaſe of moſs, it would always be found to increaſe in depth, as the climate became warmer, and the luxuriance of the growth was increaſed. But we know this is not the caſe. In ſome parts of America, for inſtance, the climate is very much warmer, and the growth is ten times more luxuriant, than in any part of Great Britain and Ireland. Were the depth of moſs ſtrata regulated by the warmth of the climate, and extent of vegetation, it would be ſome hundred feet deep in ſuch places. But the fact is, no moſs earth is to be found there. The reaſon is plain. Though the warmer climate produces a much more luxuriant crop, yet from the greater degree of heat, and the ſolubility of herbage growing in a milder climate, the progreſs of the putrefactive fermentation, is alſo much more rapid. Doe not Dr. Walker himſelf, in the paſſage quoted from page 24th of his Eſſay, inform us, that moſs is only found in the temperate and cold climates, where the heat is not ſo powerful as to complete the putrefactive fermentation, and that even in low ſituations in this iſland, the putrefaction is more advanced, and the peat more conſumed, than in the higher parts, where a greater degree of cold prevails?

The truth is, the depth of the moſs ſtrata, is not regulated as the doctor aſſerts, by the greater luxuriance of vegetation, but by the degree of inſolubility in the moſs earth; and that inſolubility does not proceed from a luxuriant growth, but from the degree of cold, and quantity of moiſture preſerved on the ſoil.

The deepeſt peat ſtrata are not always to be found neareſt the level of the ſea; neither do the moſſes in Ireland, ſeem to be ſo deep as ſome of thoſe in the county of Lanark. Dr. Walker eſtimates the greateſt depth of moſs in Scotland at 12 feet, and thoſe in Ireland at 20 feet. But I can point out moſſes in Scotland, at a thouſand feet of altitude above the level of the ſea, four times the depth he mentions. I lately attempted to ſound Moſs-mulloch in Avendale, and ſunk wooden rods upwards of 40 feet, without finding the ſubſoil. The rods became ſo unmanageable, that I could not aſcertain the depth of the moſs. No part of this moſs can be water-born, for it is ſituated in the ſummit of a high ridge, with a great declivity on all ſides. * I have no doubt but many

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* Tradition reports, that the prieſthood of former times, found means to lay the people who lived between this moſs and the Aven, under contributions, for prayers to prevent the moſs from overflowing them and their property. Some of the order had propheſied, that it would overwhelm them, and the prayers were had recourſe to, to ward

The extraordinary growth of moſs does not therefore proceed from the mildneſs of the climate, or luxuriance of vegetation, but is to be imputed to the ſuperabundance of moiſture on the ſurface, and the coldneſs of the climate. Hence we find ſome moſſes in wet and level ſituations are of a vaſt depth, and are ſtill faſt increaſing; while others in their vicinity as old, but only rendered drier, are either ſtationary, or declined in thickneſs. Hence, too, are the different horizontal ſtrata of flaw or brown moſs, and black, or more conſumed moſs above each other, on alternate layers, accounted for. The brown moſs, reſembling half decayed tow, is formed from the bog-moſs plant, which grows when the ſurface was kept ſoaked in damp; and the black moſs is formed from the deer-hair, and richer moſs plants, that grew when the moſs was laid drier, and from that cauſe is more advanced in putridity.

Dr. Anderſon, when combating the generally received opinions of philoſophers, as to the origin of moſs, with a view to introduce his fanciful vegetable, enters into calculation, to ſhow that it would require *nine hundred thouſand years*, to form, of decayed vegetables alone, a moſs 20 feet deep. The ſtory is better calculated to excite laughter, than to merit a reply. There is not in fact, any data from which the extent of the growth of moſs can in all caſes be aſcertained. The moſſes on the Forth, which are well known to have begun to be formed over wood tumbled down by the Romans, 1500 years ago, are generally from 3 feet to 15 feet deep; while Moſs-mulloch, probably begun to be formed within ſix hundred years, is about 40 or 50 feet deep. The origin of the moſs at Genderhill, in which the Roman veſſels were found, may fairly be traced to that people; yet it is not more than four or five feet deep. Others of the ſame, or ſtill greater age, are not near ſo deep. In a word, the depth of moſs ſtrata is neither regulated by age, nor by luxuriance of growth, but depends entirely on the quantity of moiſture on the ſurface, and the degree of the cold.

Having ſhown that moſs is neither an original earth, a production of the univerſal deluge, nor a plant *ſui generis;* but that it is a vaſt collection of vegetable matter, in a partial ſtate of decay, firſt begun to be formed over fallen wood, and being preſerved from complete diſſolution, by its inſoluble qualities, has grown up and accumulated on the ſurface, faſter or ſlower, according to the rigour of the cold, and humidity of the ſurface; I now proceed to inquire into the

Qualities of Moſs.

NOTHING is more wanted concerning moſs, than correct information as to the principles and qualities to be found in that ſpecies of earth. It would be of the utmoſt importance to know, what are the eſſential elements or ſubſtances of which moſs is compoſed; how theſe are collected, and united into plants by vegetable organization; what are the chemical principles and qualities to be found in moſs-plants, either when they are freſh, or after they have undergone partial or entire putrefaction. Till ſuch information is obtained, the uſes to which peat-earth is capable of being converted, muſt remain in a great meaſure obſcure. For though ſome uſeful diſcoveries may be ſtumbled upon, as it were by accident, yet no regular and well digeſted ſyſtem of improvement can be laid down and acted upon with confidence, till at leaſt ſome general knowledge be acquired, not only as to the conſtituent principles, and chemical qualities to be found in moſs, in all its ſtages, from the firſt formation of the vegetable fibre, until its complete diſſolution by putrefaction; but alſo, till it is aſcertained what ſubſtances act moſt powerfully, either in promoting the growth of moſs-plants, or in forwarding or retarding its decompoſition by putridity.

Important as ſuch information would be, it has been but little ſought after by thoſe who were qualified to make the inveſtigation. Some ſlight reſearches have indeed been made by individuals, and uſeful hints have been thrown out; but meritorious as theſe are, ſtill they are no way adequate to the importance of the ſubject.

It is only to thoſe who are well verſed in ſcience, that we can look for ſuch information. And it is to be regretted, that ſome of the few who have turned their attention to the ſubject, and who did not want the erudition and abilities neceſſary to have enabled them to make uſeful diſcoveries, have proſtituted theſe to the invention and ſupport of fanciful theories, and extravagant ſpeculations, rather darkening, than throwing light on the ſubject.

I am ſorry that I am diſqualified from remedying the evils I here complain of. Having neither the abilities, the learning, nor other means neceſſary for making ſuch reſearches; all I ſhall here attempt, ſhall be merely to mention ſome of the principal qualities in moſs, which are moſt obvious and perceptible, without pretending to make a complete analyſis.

Inflammability is a quality which moſs poſſeſſes to a very high degree. It is evident, that as putrefaction of the moſs advances, the inflammability of the peat-earth is increaſed. Hence the upper ſtrata are laid aſide when peat is dug for fuel; and where the moſs has been in nearly the ſame ſtate of humidity during the time of its accumulation, the under ſtrata are always the beſt peat. This quality in peat-earth renders it of very great utility as fuel. The quality of the fuel, or in other words, the inflammability of the peat, is evidenced by its colour. The blackeſt moſs makes always the beſt peat.

Acidity is another quality eaſily perceptible in peat-earth. Hence the unpleaſant ſmell, and the poignant pain in the eyes, which are felt from peat ſmoke; eſpecially by thoſe that are leaſt accuſtomed to breathe in ſuch an atmoſphere. Lord Meadowbank deſcribes the acid of peat-earth to be of the nature of ſomething reſembling the Gælic acid.

Inſolubility, and an *antiſeptic quality*, * are alſo clearly perceptible in moſs-earth, far beyond what is to be found in any other earthy ſubſtance. Theſe qualities are the gifts of nature, which is not more wonderful in her rich variety, than in the infinity of her laws, and the properties ſhe confers on her works, Some plants no ſooner attain maturity, and get their ſeeds for a new crop diſperſed, than they die. Their frame is ſpeedily diſſolved. Their parts are ſeparated by putrefaction, and they reſtore the ſubſtances of which they were compoſed, to the elements from whence they had been collected. Theſe very ſubſtances are ſerved out by nature, to form a new generation of vegetables. Other plants are, at leaſt in ſome ſituations, furniſhed with powers, not only to reſiſt the progreſs of corruption, ſo far as regards the reduction of their own frame, but even to prevent it from diſſolving other bodies, which in any other ſituation would go ſpeedily into putrefaction. The moſt valuable plants, and the richeſt graſſes, which grow in dry and fertile ſoils, and are reared in a genial heat, generally form the moſt bulky crops. But no ſooner do ſuch luxuriant crops ceaſe to grow, than they are ſubjected to corruption. That terrible deſtroyer of all vegetable and animal organized bodies, ſoon reduces their fibre, ſeparates their component parts, and completely decompoſes them in a ſpace of time, not much beyond that in which they were collected and formed by vegetable organization. But moſs plants are capable of reſiſting that awful deſtroyer putrefaction, for a much longer ſpace of time than any other vegetable or animal ſubſtance. Their growth is but ſmall, compared with that of the richer graſſes, but their ſolubility and putrefaction is ſtill proportionally ſlower; ſo that ſomething of their vegetable fibre and texture is preſerved, for many centuries, after the plant has ceaſed to grow. The growth of one year riſes above that of another, but little diminiſhed in ſize, till the moſſes have accumulated to the vaſt depth in which we now find them.

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* "This antiſeptic quality cannot be aſcribed to any of the mineral "acids. For they appear not in our moſſes, either ſo frequently, "or ſo copiouſly, as to produce this general effect. Neither can it "be aſcribed to the vegetable acids, which is ſtill more feeble and "inadequate to the purpoſe. But probably to a union of the vegetable acid, with the inflammable matter of the vegetable ſubſtance; "the reſult of which combination muſt be a bituminous matter." Dr. Walker's Eſſay on Peat, page 33.

Theſe ſingular qualities extend to every thing buried under moſs. Wood when expoſed to the atmoſphere, or buried under any other earth, will be totally annihilated in a few years; but if it is enveloped in moſs before putrefaction has made much progreſs upon it, it will remain but little impaired for many centuries. The under ſide of moſs-timber is generally found entire. The progreſs which corruption has made on the upper ſide, muſt have been before the moſs roſe over the trees.

Some iron heads of arrows, wooden bowls, three ſacks full of nuts, and a coat of an ancient texture and conſtruction, were, in the year 1737, dug from under a moſs, 15 feet deep, in Ireland. All of them were in a high ſtate of preſervation. (Archæologia, vol. vii. page 3.)

Not only wood and utenſils, but even animal ſubſtances, which are ſtill more ſuſceptible of corruption, have frequently been found entire, after remaining buried under moſs for ſeveral hundred years. The antiſeptic qualities of peat-earth, ſeem to exceed in their effects, even the art of embalming, practiſed by the ancient Egyptians. In vol. xxxviii. of the Philoſophical Tranſactions, for the year 1734, p. 413, mention is made of two human bodies, dug from under moſs, where they had remained 49 years, and yet corruption had not made the ſmalleſt progreſs upon them. Their fleſh was quite fair, and pitted when preſſed with the finger; the joints played freely without the leaſt degree of ſtiffneſs, and their clothes were no way impaired.

In vol. xliv. of that book, page 571, for the year 1747, an account is given of the body of a woman, found under a moſs in Lincolnſhire, which from the antique ſandals found on her feet, had evidently remained many centuries under the moſs, yet the body had ſuffered nothing by corruption. Her hair and nails were as freſh and free from putrefaction, as thoſe of any living perſon. Her ſkin was ſoft and ſtrong, and ſtretched like Doe leather; but had acquired a tawny colour.

The counteſs of Moira, in a letter publiſhed in vol. vii. of the Archæologia, mentions, that a human body was found under moſs, *eleven feet deep*, on the eſtate of her noble huſband. The body was completely clothed in garments made of *hair*, and which were freſh and no way impaired; and though the *hairy* veſtments evidently points to a period extremely remote before the introduction of ſheep, and the uſe of wool, yet the body and the clothes were no way impaired.

A piece of cloth, dug from under moſs, *ten feet deep*, on the lands of Flatt, in the pariſh of Glaſsford, Lanarkſhire, was found to be freſh and well preſerved. This piece of cloth was brought up from the bottom of the peat foret, on the point of the peat-ſpade; but the incurious labourer, was neither at the pains to preſerve it, nor ſo much as to examine if any more clothes were depoſited in the ſame place. Probably this might be part of the clothes of a perſon buried there, at ſo remote a period, that the moſs had riſen 10 feet over it. Whether a human body had lain there or not, the cloth muſt have been ſo depoſited; for the ſolidity of the moſs over, and round where it was found, prove that it had not been buried in a pit dug into the moſs.

The antiſeptic quality of moſs extends to all water in which peat has been infuſed. Moſs-water, even when ſtagnant, and in the warmeſt climates, neither acquires the putrid ſmell, which ariſes from other ſtagnant water; nor do the plants grow, or the animalcule gender, which we ſee like a green ſcum upon the ſurface of all other ſtagnant water, in hot weather, even in this cold climate. Captain Cook found moſs-water good and wholeſome, after being kept long on ſhip board, even in warm climates. It had never become the leaſt putrid. Many people live in the midſt of much ſtagnant moſs-water; yet they are healthy, and live to as great ages, as the inhabitants of the drieſt and warmeſt ſoil. No people whatever are more healthy, than thoſe who live in the moſt extenſive and wetteſt moſſes; while among the inhabitants of all low, damp, and fenny places, where ſtagnant water that has not been impregnated with moſs prevails, intromitting putrid fevers, putrid ſore throats, and other malignant diſeaſes, are very common. Wherever peat is uſed for fuel, and eſpecially in the low ſmoky houſes, which abound in the muir country, vaſt quantities of the peat-ſmoke, and peat-duſt, muſt paſs into the lungs of the inhabitants, with the air they breathe, as well as into their ſtomachs, with their food and drink, yet their health is no way impaired thereby.

Dr. Walker, in that valuable Eſſay ſo often quoted, gives the chemical principles of peat-earth, from p. 25 to 30. Believing it to be correct, and being unable to analyze that ſubject myſelf, my readers muſt accept of what ſeems to me the moſt complete and conciſe analyſis to be found.

" Previous to the examination of peat, it is proper
" to take a view of the principles of freſh, and of
" putrid vegetables, and to mark wherein the two
" coincide, and wherein they differ.

" All freſh vegetables, by chemical diſtillation, are
" found to conſiſt of *air*, *water*, *oil*, *ſalt*, and *earth*.

"The air they contain is of different ſorts; and, "though confined, is liberated in large quantity by "diſtillation, and by every proceſs of fermentation.

"The water they contain generally makes the "moſt conſiderable part of their bulk and weight.

"An oil, or inflammable matter, is obtained from "vegetable ſubſtance by diſtillation, and from many "by mère expreſſion.

"The ſalt they contain is of three kinds. The "firſt called their eſſential ſalt, is generally of an acid "or ſaccharine nature. It appears naturally by exu"dation, as in honey; and chemically, by expreſſion "and cryſtalization, as in the ſalt of ſorrel, and in "ſugar. The ſecond, called the fixed alkaline ſalt, "ſuch as potaſh, is obtained by burning them in the "fire. In this ſalt, the chief merit of all vegetable "aſhes conſiſts as a manure. The third, or volatile "alkali, is a ſalt obtained from a few plants in their "recent ſtate, by diſtillation; but from all plants, "and in larger quantity, after they have undergone "the proceſs of putrefaction.

"The earth obtained from vegetables, by calcina"tion, is white and impalpable, and chiefly conſiſt "of the earth of alum and calcareous earth. No "wonder, therefore, that the calcareous earth and "clay, which abounds ſo much with the earth of "alum, ſhould be ſo friendly to vegetation.

"But when vegetables have undergone putrefac"tion, the chemical principles obtained from them "are very different. The air and water they afford "in diſtillation differ much in their qualities from "thoſe of freſh vegetables. They afford oil, but "always remarkably fetid.

" The moſt noted diſtinctions, however, between " freſh and putrid vegetable ſubſtance, conſiſts in the " following character: that, from putrid vegetables, " no eſſential ſalt, no fixed alkaline ſalt, nor any " other, but the valuable alkali, is procured."

" The earth of vegetables, that remains after the " laſt ſtage of their putrefaction, has never been accurately examined. It is only preſumed to be " nearly the ſame with what they afford by incineration.

" We are not yet informed of any acid obtained " from putrid vegetables. In their recent ſtate, there " are acids contained in their eſſential ſalts; but theſe " acids, or corruptible compounds, deſtroyed by " putrefaction. After putrefaction, plants are only " known to yield on diſtillation, air, water, a fetid " oil, volatile alkali, and earth.

" Such then being the general chemical principles " obtained from freſh and putrid vegetable ſubſtance, " let us now compare them with thoſe which are " afforded by peat."

" We are informed by Wallercus, * that the peat " in Sweden, yields, upon diſtillation, beſide air and " water, a volatile ſpirit reſembling that of hartſhorn, " ſome volatile ſalt, and a fetid oil. And likewiſe, † " that the fluid and ſaline matters in the Swediſh " peat, amount nearly to one half of its weight. But " the degree to which the peat had been previouſly " dried, is not ſpecified."

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* Waller. Mineralogia, tom. i. p. 17.

† Waller. Syſt. Min. vol. i. p. 22.

“ Le Sage, ‡ from 18 ounces of French peat, obtained by diſtillation, as follows:

“ Water of a diſagreeable ſmell, - -	2 oz.
“ Spirit of volatile alkali, - - - - -	$4\frac{1}{2}$
“ An oily ſaponaceous matter, - - -	$1\frac{1}{2}$
“ Volatile alkali concreted, - - -	$0\frac{1}{16}$
“ Reſiduum deſtitute of ſalt, - - -	$9\frac{1}{2}$
	$17\frac{5}{16}$

“ Theſe principles, obtained from peat by diſtillation, demonſtrate its real nature and origin, that it is eſſentially compoſed of putrid vegetable matter. From peat dug in Holland, Le Sage, indeed, beſide a thickiſh oil, obtained an acidulated water, and marine acid, and found in the reſiduum, a ſmall portion of ſelenite, of Glauber-ſalt, and ſea-ſalt. Theſe, however, may have been occaſioned by the pit having been overflowed by the ſea, which is the caſe with many of the turf bogs in Scotland. Such extraneous matters muſt, no doubt, often occur in the analyſis of a body, ſo generally ſpread over the ſurface of the earth. But in peat, as in every other vegetable ſubſtance that has undergone putrefaction, though the volatile alkali abounds, no fixed alkaline-ſalt has ever been diſcovered.

“ Such are the principles by diſtillation, from crude and putrid vegetable ſubſtance, and from peat. But the late diſcoveries in pneumatic chemiſtry, have thrown much new light on the elements of

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‡ Le Sage, Mem. de Chynue, p. 35.

“ plants, and on the products they yield by the diſtilling heat. They have ſhown that during this operation new combinations are formed. They have demonſtrated that ſeveral of the above products afforded by diſtillation, do not previouſly exiſt in the body diſtilled, but are formed from their principles by the action of fire. This is particularly the caſe with the volatile alkali, and the empyreumatic oils. The above proceſſes of diſtillation, therefore, only ſhow, that though the vegetable ſubſtance does not itſelf contain theſe bodies, it contains the principles of which they are formed.

“ Lavoiſier's account of the principles of vegetables, is very general. In ſome of its parts too hypothetical, though aſſerted to be otherwiſe: and the whole, though from no fault of his, very imperfect. He endeavours to explain by his theory, which is highly plauſible, the phenomena of experiments that have been made. But it would have been more ſatisfactory to have eſtabliſhed that theory by experiments of his own. The want of theſe we can now only deplore. His aim at ſimplicity is moſt laudable. But ſimplicity is only deſirable where it really exiſts.”

Uſes of Moſs.

THE chief uſes to which peat-earth may be converted, are *Fuel, Manure*, and a *Manured ſoil.*

Fuel.

THE utility of peat as a fuel, is ſo univerſally known, and ſo well underſtood, that it is needleſs to ſay much on that ſubject. Where coal, or other fuel is ſcarce, peat becomes an article of conſiderable value. But in the diſtrict of Avendale, to which my remarks were intended to be limited, coal is found in ſuch abundance, and of ſuch excellent quality, as to render peat of ſmall value as a fuel. The quality of peat, and the mode of cutting and drying it are ſo well known, as to ſuperſede the neceſſity of pointing them out. The only improvement I could ſuggeſt, would be to erect ſheds at the farm-houſes, to ſcreen the peat-ſtack from the rain. In this rainy climate, the peats, when expoſed to the weather, are rendered almoſt uſeleſs through one half of the year. The ſmoke of damp peat is extremely unpleaſant; and, when in that ſtate, they make a wretched fuel. Theſe inconveniences might be remedied at a ſmall expence. A ſhed might be formed of the roofing of an old houſe, ſet upon pillars, or upon a wall built of ſtones without mortar, ſo as to admit a current of air. This ſhed, thatched with ruſhes, turf, &c. might be erected at a trifling expence, and would prove of great advantage to every family who uſe peat as a fuel. The ſhed, beſides improving the peats, would be a ſaving in a few years, far beyond the coſt of erecting it. A man is always employed, ten or twelve days every year, at every farm-houſe, *building* the peats into a ſtack; every peat is laid with as much care, as bricks in a wall. This great labour might all be ſaved, by erecting ſheds into which the peats could be *thrown* without building. And if ſuch ſheds were erected, the peats could be brought home, though not completely dry. The current of air paſſing through the ſhed, would ſoon complete their dryneſs, while the ſhed would preſerve them from being again wetted. When peats are often wet and dried alternately, (as they muſt be in an uncovered ſtack,) they loſe much of their inflammability, and are ultimately formed into mould.

In Holland, Ireland, and ſome parts of Galloway, where the only moſs to be found is a kind of ſludge, which does not adhere, they lay it out in heaps upon the graſs, water it, and bake it into a kind of paſte, by treading or beating it like lime for plaſter; after which it is cut into peat, which is found to be of ſuch ſuperior quality, as more than compenſates the additional labour. As this mode of baking the peat makes fuel of a very ſuperior quality, I would recommend it, particularly where the peat is to be uſed in drying corn.

The ingenious and patriotic Mr. Millar, of Dalſwinton, has found out a method of making an artificial peat, from a compound of peat-mud, coal-culm, ſaw-duſt; tanner's bark, or any ſuch like inflammable ſubſtances, mixed with cow-dung, and a quantity of clay. Theſe, when properly mixed, and in due proportions, make an excellent and durable fuel. The clay adds greatly to its durability, and renders the aſhes of great value as a manure. Such improvements merit attention wherever fuel is ſcarce.

Moſs conſidered as a Manure.

MUCK has long been conſidered in Scotland, as the mother of the meal-cheſt. To increaſe manure, tends to increaſe the human race, to render them more comfortable, and their ſubſiſtence more ſecure. Manure has been conſidered of ſuch importance, that many millions have been expended to dig it from the bowels of the earth, for the purpoſe of enriching the ſoil, or forcing its dormant powers into action. To beſtow ſuch vaſt labour and expence on enriching the ſoil, was highly meritorious. But if ſuch a valuable and neceſſary article can be found on the ſurface, much of that labour and expence may be ſpared; while the culture of the ſoil, and conſequent increaſe of the moſt uſeful plants, might be ſtill more promoted.

Vegetable ſubſtances of every kind, whenever they have undergone putrefaction to a certain extent, operate as a manure to the ſoil. Moſs has already been ſhown to be nothing elſe than a vaſt collection of vegetable matter under a partial decay. It would therefore form a rich and valuable manure, were not its putrefaction prevented, or retarded by the inſoluble and antiſeptic qualities which has been already mentioned. It is owing to this quality in moſs, that ſuch a ſubſtance is preſerved on the face of the earth. The conſequence is, it is much leſs valuable as a manure, than any other ſpecies of vegetable matter. Could moſs-earth only be diveſted of theſe its powers of reſiſting putrefaction, the whole moſſes would become ſo many immenſe dunghills. Conſidering how unproductive moſs is in its preſent ſtate, and how injurious it is to the atmoſphere; the method of making it undergo complete putrefaction, would be a moſt important diſcovery. The proper inveſtigation can only be made by thoſe who are converſant in ſcience. Being but little acquainted with chemiſtry, I muſt content myſelf with mentioning what others have diſcovered, or what I have had acceſs to ſee in practice, and which, I am confident, will prove of vaſt utility, if only put in practice.

Moſs, in the natural ſtate in which we find it, will operate as a manure to every other ſoil, in the ſame way that one earth enriches another. Moſs will help to change the mechanical arrangement of any other ſoil, which is often its greateſt defect. The extreme coheſiveneſs of a clay ſoil, often renders it unproductive, until that defect is overcome. A mixture of moſs would help to render the tenacious clay more open, give a better ſcope to the roots of plants, and make the clay leſs retentive of moiſture in wet weather, and leſs adheſive when dry. Moſs, upon ſandy ground, would deepen the ſoil, render it more retentive of moiſture, and prevent the crop from being ſo eaſily injured by the drought. The heat of the ſand would promote the putrefaction and decompoſition of the moſs, and melt it down to manure. Mixing of one ſoil with another, forms, in all caſes, a powerful and a permanent improvement. But when moſs-earth is applied to a ſoil compoſed of a different earth, it proves doubly beneficial; becauſe it not only helps to correct the defects of the ſoil, as any other ſpecies of earth would do, but, being wholly compoſed of vegetable matter, the greater warmth of the ſoil, promotes its putridity, and reduces it to a more powerful manure.

Moſs has theſe effects even when in a ſtate of nature. But in an age ſo enlightened as the preſent, it might well be expected, that means would have been diſcovered of reducing the antiſeptic and inſoluble qualities of moſs, and thereby relieving the fructifying virtues of a vegetable matter, which theſe qualities lock up in the moſs-earth. Had application been made to the ſubject, in any degree proportioned to its importance, ſome uſeful diſcoveries might certainly have been made. I know of no diſcovery in agriculture of equal importance. Moſs-earth is wholly compoſed of Carbon, and other ſubſtances which are known to compoſe the beſt food and nutriment of vegetables. But nature has laid theſe rich and valuable ſubſtances under a ſort of embargo. Inſolubility locks them up in the undecayed moſs-earth, where their richeſt qualities lie dormant, till the all-ſearching hand of chemiſtry reach them, "and force their ſhyeſt virtues out." Whoever ſhall diſcover how to make moſs undergo complete putrefaction, would render a moſt important ſervice to mankind. I know of no diſcovery of the laſt century of near ſo much conſequence. Could that great end be accompliſhed at a moderate expence, the greateſt part of the land in Scotland, would thereby be rendered as fertile as could be wiſhed for. The deſert would become a fruitful field indeed, and ſubſiſtence might be raiſed, for four times the preſent number of inhabitants. Till further diſcoveries are made, I ſhall point out what is already known and found to be practicable in that reſpect.

The putrefaction and decompoſition of moſs, or, in other words, converting it into manure, has been found to be greatly promoted, by mixing it with lime, or with dung, in due proportions. It is now upwards of *thirty* years ſince I firſt ſaw both theſe methods practiſed with much ſucceſs, by the late William Arnot, Eſq. of Silverwood, on the farm of Mains of Grougar, in the county of Ayr. He mixed large quantities of moſs-earth, the moſt rotten he could find, with a ſmall quantity of horſe-dung, and when it had heated, turned it over, and broke the moſs, which became excellent manure. When he could not find dung, he uſed half-ſlacked lime for that purpoſe. The only dung then made upon the farm, was from four work-horſes, who lay out on paſture during the ſummer. Much of this dung was uſed in the garden, and to plant potatoes, &c. yet with the reverſions, and ſome hot lime, that gentleman, (or rather John Aird his farmer,) converted as much moſs into manure in one ſeaſon, as dunged fourteen acres of land for turnip. The ſoil to which it was applied, was of the worſt and pooreſt of clay, which had not been thought worth ploughing for a very long period before. But being followed for two ſeaſons, and being limed, and a good dreſſing of moſs, fermented with lime, or with dung, applied, a moſt luxuriant crop of turnips was raiſed. The corn next year was alſo a rich crop, and the land, which was formerly conſidered as nearly uſeleſs, has ſince been very productive. Theſe facts I can well atteſt, as the field of which I ſpeak lay within view of my father's window, and at leſs than half a mile diſtant. I was an eye-witneſs of the whole operations, and aſſiſted at ſome part of the work.

I have witneſſed many other inſtances of moſs prepared for manure, by a mixture of lime and of dung, and which I never ſaw fail to turn out a productive and a profitable manure. But without enumerating inſtances, I ſhall conclude my remarks in favour of the preparation of moſs with lime, by quoting a paſſage from a work of that moſt worthy and learned nobleman, the earl of Dundonald, who has devoted his brilliant talents to the moſt uſeful reſearches in chemiſtry and agriculture, (p. 108.)

"The beſt preparation of peat when intended for a " top-dreſſing manure, is by the addition of alkaline " ſalts, or alkaline hepars, or by a mixture of Glauber ſalts, and hot lime with peat. (Page 109.) The " ſcarcity and high price of the above ſaline matters, " in addition to a due want of knowledge of the proper ſtate which peat ſhould be in, when theſe ſubſtances are intended to be mixed together, have " hitherto precluded the uſe of alkaline ſalts for the " improvement of the ſoil. The only ſubſtance of a " cauſtic nature and capable of deſtroying the organic " texture of vegetable bodies, which in ſome places " has been uſed, is lime, though not in ſo judicious " a manner as to enſure, at all times, uniformly, good " effects from its application, which can never be de-

“ pended upon, if the proportions of each ſubſtance, and the particular ſtate of them are unattended to and neglected, as will appear by the following obſervations.

“ When hot, or newly calcined lime is broken into pieces of a ſmall ſize, and mixed with peat, moderately humid heat is diſengaged, and that heat by the ſlacking of the lime, when it is applied in too great a proportion, is ſo increaſed, as completely to reduce the peat to charcoal, and to diſſipate in a gaſſious ſtate, all its component parts, excepting the aſhes, part of the carbonaceous matter, and ſuch a portion of fixable air, generated in the proceſs, as is abſorbed by the lime, by which that ſubſtance is made to return to the ſtate of chalk. No benefit can therefore ariſe by this method of preparing peat with lime, the object not being to deſtroy and diſſipate, in a gaſſious ſtate, the component parts of the peat; but to make ſuch a combination with the lime, and the gas generated in the proceſs, as will, on the application of the mixture to ground, promote the growth of plants.

“ This object is beſt attained by mixing newly made, and completely ſlacked lime, with about five or ſix times its weight of peat, which ſhould be moderately humid, and not in too dry a ſtate. In this caſe the heat generated will be moderate, and never ſufficient to convert the peat into carbonaceous matter, or to throw off, in the ſtate of fixable air, the acids therein contained. The gaſſes thus generated, will be inflammable and phlogiſticated air, forming volatile alkali, which will combine, as it is formed with the oxygenated part of the peat, that "remains unacted upon by the lime, applied for this "eſpecial purpoſe, in a ſmall proportion. By this "mode of conducting the proceſs, a ſoluble ſaline "matter will be procured, conſiſting of phoſphat "and oxalat of ammoniac, whoſe beneficial effects on "vegetation have already been deſcribed.

"Inattention, or ignorance of theſe important facts, "has probably, in many caſes, defeated the wiſhes of "the farmer, in the application of this preparation, "which is particularly recommended as a top-dreſſing "to grounds under paſture. The proportion of lime "to the peat here given, ſhould be carefully attended "to; and the mixing of the two ſubſtances together, "ſhould be performed under cover, in a ſhed or out-"houſe conſtructed for that purpoſe, as too much "rain, or a too great expoſure to air, will prevent a "due action of the lime upon the peat. The ſucceſs "of moſt operations, but more eſpecially of thoſe of "a chemical nature, greatly depends upon a regular "and due obſervance of circumſtances apparently "trivial.

"This preparation of lime and peat, is in a peculiar "manner conducive to the growth of clover, and of "the ſhort, and, as they are called, ſweet kinds of paſ-"ture graſſes. The ſoil alſo, by the application of it, "acquires ſuch a prediſpoſing tendency to promote "the growth of ſuch graſſes, as to prevent its growing "afterwards rank, coarſe, or ſour herbage."

It ſeems moſt reaſonable to ſuppoſe, that ſuch ſubſtances as have a tendency to create ſome degree of heat in the moſs-earth, muſt act moſt powerfully in overcoming the inſoluble qualities of the moſs, reducing its vegetable fibre, and thereby converting it into manure. It has been ſhown that moiſture and cold, to a certain degree, are neceſſary to the formation and preſervation of moſs. For though the moſs plants may grow in warm climates, yet the greater degree of heat reduces them by putrefaction. But where cold prevails, the putrefaction is retarded, and the half-decayed moſs plants riſe from year to year, one crop over another, till they accumulate to a kind of earth. In looking out for ſubſtances to overcome that inſolubility, one would naturally try that which created ſome degree of heat. Experience has proved this conjecture to be well founded. Dung and lime have theſe effects, and chemiſts as well as practical farmers, have now ſanctioned the opinion, that heat is neceſſary to promote the putrefaction of moſs-earth.

A ſmall pamphlet was lately publiſhed, the honour of which common fame gave to the learned and patriotic Lord Meadowbank, and which has ſince been proved to be his work, by being publiſhed among the Prize Eſſays of the Highland Society. In this treatiſe, directions are given for forming moſs into manure, by mixing and fermenting it by means of freſh dung.

The learned judge gives a plain and conciſe account of the proceſs of putrefaction of vegetables, and makes ſome judicious remarks on the propriety of preſerving the richeſt qualities of dung, too often loſt through miſconduct. The eſſay is written in ſo plain and familiar a ſtyle, that the ſimpleſt mechanic may eaſily underſtand its import; and every farmer ought to know, and attend to the directions it contains.

After mentioning ſomething of the nature and antiſeptic qualities of moſs, the learned judge remarks. "In general, however, there is nothing in "the ſituation of peat-moſs, or in the changes it has "undergone, that leads to think that it has ſuffered "any thing that unfits it to be prepared for manure. "It is no doubt found ſometimes mixed with particu-"lar mineral ſubſtances, that may be for a time perni-"cious to vegetation; but, in general, there is no ſuch "admixture; and when it does take place, a little "patience and attention will be ſufficient to cure the "evil. In the ordinary caſe, the only ſubſtances "found in peat that may be unfavourable to vegeta-"tion, in ſo far at leaſt as tending to keep it ſtation-"ary, and prevent its rotting, are two, and both a-"abounding in freſh vegetables, of the ſorts of which "moſs is chiefly compoſed: theſe are galic acid, "or ſome other very like it, and the aſtringent prin-"ciple of tan; and as theſe are got the better of in "freſh vegetables, by the hot fermentation to which "they are ſubject, ſo as to leave the general maſs of "the ſubſtances to which they belonged properly pre-"pared manure, there is no reaſon to ſuppoſe, that "the ſame may not be accompliſhed with the acid "and tan of peat. Again, the powers of peat as a "fuel, and of aſhes of peat as a manure, ought to "convince every perſon, that the material and more "eſſential parts of the dead vegetable, for the forma-"tion of manure, remain entire in peat. Here "the inflammable oils and carbonaceous matter which "abound in the freſh vegetable, and the latter of "which alſo abounds in garden-mould, remain en-"tire; the ſoot and aſhes too, which are the reſults "of the inflammation of each, ſeem to be nearly e-

" qually fertilizing; and, in ſhort, little ſeems to be " loſt in peat, but the effects of the firſt fermentation, " in preparing the matter to undergo its future " changes, with the rapidity requiſite to conſtitute " manure. Beſides the ſoil produced from peat-" earth, by expoſure for a courſe of years, ſeems not " to be ſenſibly different from that obtained from " dung in the ſame way. Both are deficient in firm-" neſs of texture; but are very prolific when mixed " with clays, ſands, and calcareous earths, in due pro-" portions.

" From conſidering the preceding circumſtances, " and from trying what ſubſtances operated on tan, " and on the acid found in peat-moſs; it was deter-" mined to ſubject it to the influence of different ſorts " of fermenting dung, with due attention to the pro-" portions uſed, and to the effects of the different pre-" parations; and the following is the direction which " an experience of ſix crops recommends to prac-" tice." (Prize Eſſay, pages 143, 144 and 145.)

His lordſhip goes on to give particular directions for forming the compoſt. The moſs to be uſed, he ſays, may be taken either from the top, or from the bottom of the ſtrata, provided only the turf on the ſurface be laid aſide. That which is moſt compact, and fitteſt for fuel, ſhould be preferred. The moſs ſhould be thrown out from the pit for a few weeks, till it is diveſted of ſome part of its moiſture, then carted to the field, and mixed with freſh dung, into a compoſt midding, four or 4½ feet high. He recommends the firſt ſtratum to be of moſs, 6 inches deep, dung 10, peat 6, dung 4, peat 6, and then a layer of dung, and the whole midding covered over with moſs.

The materials ſhould be thrown looſely together, and not trodden, as too much ſolidity would prevent the fermentation.

The quantity of dung to that of the moſs ſhould be regulated by the ſtate in which theſe ſubſtances are when mixed together. If the dung happens to be freſh, and much diſpoſed to fermentation, the moſs free of turf, and tolerably dry, the quantity of dung need not exceed one-fourth of the compoſt; that is, one ton of ſuch dung, will be ſufficient to mix into three tons of half dried moſs. But if the dung is compoſed of poor meagre ſubſtance, has not attained its higheſt pitch of fermentation, or if the fermentation has proceeded too far, and the moſs ſoaked in water, a greater proportion of dung muſt be uſed. As the purpoſe of mixing the dung into the midding, is to raiſe heat and fermentation in the compoſt, a greater quantity muſt be uſed in winter, than will do if the mixture is put together in ſummer. Dung from the ſhambles, or the dung of fowls, will ferment double the quantity of peat-earth that any other dung will.

" The compoſt after it is made up, gets into a
" general heat, ſooner or later, according to the
" weather, and the condition of the dung; in ſum-
" mer, in ten days or ſooner; in winter, not perhaps
" for many weeks, if the cold is ſevere. It always,
" however, has been found to come on at laſt; and
" in ſummer, it ſometimes riſes ſo high, as to be miſ-
" chievous, by conſuming the materials, (fire-fang-
" ing.) In that ſeaſon, a ſtick ſhould be kept in it in
" different parts, to pull out and feel now and then;
" for if it approaches to blood-heat, it ſhould either

"be watered, or turned over; and on ſuch an occa-"ſion, advantage may be taken to mix it with a little "freſh moſs. The heat beſide, after a time, and with "great variety, according to the weather; the dung "and perfection of making up the compoſt, which "then may be allowed to remain untouched, till with-"in three weeks of uſing, when it ſhould be turned "over, upſide down, and outſide in, and all the lumps "broken; then it comes into a ſecond heat; but ſoon "cools, and is fit to be taken out for uſe. In this "ſtate, the whole, except bits of the old decayed "wood, appears a black free maſs, and ſpreads like "garden-mould. Uſe it weight for weight, as farm-"yard-dung, and it will be found, in a courſe of crop-"ping, fully to ſtand the compariſon.

"Let it be obſerved, that the object of making up "the compoſt, is to form as large a hot-bed as the "quantity of dung employed admits of, and then to "ſurround it on all ſides, ſo as to have the whole "benefit of the heat and effluvia. Peat nearly as dry "as garden-mould in ſeed time, may be mixed with "the dung, ſo as to double the volume and more, "and nearly triple the weight, and inſtead of hurting "the heat, prolong it." Prize Eſſay, pages 149, 150, and 151.

Compoſt, thus made up in January, may, if the froſt does not continue long, be ready for the ſpring crops. But in ſummer, it will be ready in 8 or 10 weeks, and if there be any anxiety to have it ſoon ready, the addition of aſhes, lime-rubbiſh, or lime ſlaked in foul water, applied to the dung uſed in making up, will quicken the proceſs conſiderably. "Both "the power and the duration of the manure have

" now ſtood the teſt of a great variety of trials, on a " conſiderable extent of ground, and of much diverſity " of ſoil, continued, without intermiſſion, during the " laſt ſix years. Hitherto it has been found equal, " and, indeed, preferable, to common farm-yard dung, " for the firſt three years, and decidedly to ſurpaſs it " afterwards. It has been conjectured, from the ap- " pearance and effects of the compoſt, that its parts " are leſs volatile and ſoluble, than thoſe of dung; " but that it yields to the crop what is requiſite, by " the action of the living fibres of vegetables; and in " this way waſtes ſlower, and laſts longer. Whatever " be in this, nothing has appeared more remarkable, " than its ſuperiority in maintaining (for four or five " years) freſh, and nouriſhing the paſture of thin " clays that had been laid down with it, and in mak- " ing them yield well when again ploughed, and that " without any top-dreſſing, or new manure of any " ſort." " It is believed, that the foregoing directions " will, if practiſed, prove beneficial to every farmer " who has acceſs to peat-moſs within a moderate diſ- " tance; but it is to the farmer of the ſoils now men- " tioned (thin clay,) and of hungry gravels, to whom " they would be found particularly valuable." Pages 155, 156.

This is certainly one of the moſt valuable diſcoveries ever made in agriculture. To convert a cart of dung into four, from materials of no value, and to be found every where at no expence, is a diſcovery of vaſt importance; and if duly attended to, may, in a few years, greatly enrich the whole country. Though the method of converting moſs into manure, by mixing it with freſh dung, and fermenting it, has been diſcovered, and practiſed for many years, Lord Meadowbank has the merit of being the firſt who made proper inveſtigations into the mode of preparing it, and has brought it to fixed principles, and communicated his experiments to the public. Such patriotiſm entitles him to the grateful thanks of his fellow-ſubjects.

Moſs-earth may be formed into manure by various other means. Weeds, potato-ſhaws, and all ſorts of green vegetables that have grown luxuriant when mixed into moſs, either with or without dung, will produce or accelerate putrefaction, help to keep the midding open, and enlarge and enrich the compoſt.

Putrid-water will alſo reduce the inſolubility of the moſs-earth, and convert it into manure. A great deal of corrupted water is ſuffered to remain in a ſtate of ſtagnation; a nuiſance highly injurious to the health of mankind. The quantity of putrid water that might be collected in towns and villages is immenſe; and the peat-earth it would convert into manure, is beyond calculation. At preſent it is not only loſt, but the health of the inhabitants is much injured by its vapours. Were dry moſs thrown into the ſtanks and ſewers, or the putrid water removed daily, and uſed in forming moſs into manure, an immenſe quantity of dung might be made, and the health and cleanlineſs of the inhabitants promoted. Stanks of putrid water are not confined to towns and cities, they are to be found in every paltry village, at farm-houſes, and even at the door of every cottage. The richeſt juices of the farmer's dung are ſtill ſuffered to waſte in theſe ugly ſtanks, the *midding-dub;* nuiſances which neither the proſpects of gain, the comforts of cleanlineſs, nor a ſenſe of decency, have yet been able to baniſh from the generality of farm-houſes. The fat juices from the cheeſe-preſs, waſhings of milk veſſels, offals of the kitchen, &c. are neither collected for manure, nor carried off in proper ſewers; but generally preſerved in ſome naſty ſtank near the door, or at the houſe-ſide, raiſing, in hot weather, an unpleaſant and unwholeſome ſmell. This want of decency, inattention to health and to cleanlineſs, the very firſt eſſentials of human happineſs, ſo much prevail, that almoſt every cotter and peaſant, muſt have ſome nauſeous ſtank, more or leſs, according to his rank, at or near his door. If he cannot ſtore it with the urine of cattle, or the fat and offals of milk, as much of the urine and ordure of the family, and every refuſe of the houſe, will be devoted to it, as render the water putrid, and cauſe it ſend forth an unwholeſome ſtench. You can ſeldom approach the door of a farmer or a cotter, but your eyes and your noſe ſhall be hurt with the diſagreeable ſight, and the nauſeous effluvia of a midding-dub, ſuited to the rank of the family, often in front of the main door. If dogs, cats, rats, &c. happen to be killed about the houſe, this grand nuiſance, the midding-dub, forms their common grave!

It may not be eaſy at all times, to prevent water from becoming putrid, in the vicinity of houſes or villages; but it is certainly poſſible, and highly proper, to convert it to ſome uſeful purpoſe, and prevent the inhabitants being poiſoned with its putrid vapours. No method can be ſo proper, as either mixing into the corrupted water, ſo much half-dried moſs-earth, as will abſorb the putrid moiſture, and then removing the moſs into a dung-hill, or collecting the water, and mixing it in a convenient place with moſs, which would be thereby converted into an excellent manure. Ponds might be formed, and the water rendered putrid, for the very purpoſe of making moſs into dung.

The water into which green flax has been laid in ſteep, would alſo ſerve to reduce moſs into manure. Green lint, with its ſeed, contains a large quantity of oil, and much vegetable juice, which the water wholly extracts. By our preſent economy, all theſe oils and vegetable ſubſtances, are not only loſt, but are ſuffered to become a great nuiſance. The fiſhes are killed, and the health of mankind and animals are much hurt, by the effluvia raiſed from the lint-hole. Flax ought never to be laid in ſteep in a running ſtream, but in a ſtanding pool; and the water, with the juices extracted from the lint, ſhould either be uſed to mix into half-dry moſs, with or without dung, or green vegetables carefully preſerved, and ſpread upon the land. Such rich ſap ſhould not be thrown away. Were it duly preſerved for mixing into moſs or common earth, or even laid upon the ſoil of the neighbouring field, the lives of millions of fiſhes would be preſerved, and the health of man and other animals leſs injured, not to mention the revenue that might be raiſed by ſuch induſtry.

Urine, if mixed into half-dry moſs, will reduce its antiſeptic qualities, and render it ſoluble. It ſhould therefore be carefully preſerved, and applied to that purpoſe. The pavements of byres and ſtables ſhould be laid on a bed of clay, and the urine either collected into a well, where it could be taken up with pails, or run into the dung-hill. The dung-hill ſhould be placed on the north-eaſt ſide of the houſes, ſo low that the urine would fall into it, and it ought to be as much as poſſible ſheltered from the effects of the weather, and from the exhalations of the ſun; or, as much dried moſs might be thrown daily into the floors of the ſtable and byre, as would abſorb the urine. This would be attended with two advantages. The volatile alkali with which the urine abounds, and is the beſt food of plants, but which is generally waſhed away by the ſtorms, or exhaled by the ſun, would be preſerved by the moſs, and theſe ſubſtances would render the moſs ſoluble.

The fumes of the dung, while under fermentation and putrefaction, might alſo be uſed to reduce the inſolubility of a vaſt quantity of moſs. While dung is under fermentation, much of its richeſt ſubſtances, the very beſt food of vegetation, are thrown off in gas, exhaled by the ſun and winds, if the dung-hill is expoſed, or waſhed away by the ſtorms, and totally loſt to the proprietor. All this privation might be prevented, by laying the dung in regular and level ſtrata on the dung-hill, and covering it with a ſtratum of half-dry peat-earth, ſufficient to ſcreen the dung from the injuries of the ſun and weather, and yet not too heavy to retard the fermentation of the dung. The rich gaſſes thrown off while the dung was under fermentation, would be caught and retained by the ſuper-ſtratum of moſs-earth, and prevented from going off in air; and that gas would bring the peat-earth into putridity, and thereby greatly enlarge the volume of the dung-hill. The covering of moſs would ſhelter the dung from the ſeverity of the weather, and the exhauſting powers of exhalation, which, in the preſent economy, reduces the dung one-third in its value.

The Earl of Dundonald, in his treatiſe on the connection between chemiſtry and agriculture, has ſhown that not only various kinds of ſaline ſubſtances might be uſed to reduce the inſolubility of moſs, but that even ſea-weed, and ſea-water, may both be made to ſerve the ſame purpoſe.

Unfortunately the farmers are not acquainted either with ſaline compounds, or the mode of uſing them, not to mention the expence they would coſt. Sea-weed cannot be obtained to any great extent, and ſea-water can only be uſed near the ſhores.

Moſs may be alſo rendered completely ſoluble, by means of animal ſubſtances. Lord Meadowbank takes notice of this, and mentions, that, with the body of a dead horſe, ten tons of moſs may be made into rich dung. From an experiment I cauſed a friend of mine make, I can, not only corroborate the fact, but aſſert, that from the body, blood, and inteſtines of one horſe, properly mixed with moſs, and fermented by it, with the aid of ſome weeds or other green vegetables, all twice or thrice turned over, no leſs than 18 or 20 tons of rich dung may be formed in the ſpace of ſeven or 8 months. The fumes of the putrid animal ſubſtance reduces the moſs-earth to complete ſolubility, and the moſs-earth catches and retains the effluvia of the putrid animal matter, prevents it from being carried off in gas, and preſerves it to enrich the ſoil to which the moſs is applied. How commendable it would be to diſpoſe of dead horſes in this way, in compariſon with throwing them into a ditch, to become the prey of ravens and dogs, and where the fumes of their carcaſes under putrefaction, become obnoxious to man and beaſt. Twenty, or even ten tons of rich dung, worth from five to ſeven pounds, obtained at the expence of only a few ſhillings, in labour, is ſurely a ſufficient reward for ſuch a piece of induſtry, beſides preventing the air from being poiſoned. The juſtices are not probably empowered to compel people to ſuch acts of induſtry, but they certainly have power to prevent the putrefying carcaſes of animals to remain unburied.

Not only dead horſes, but the carcaſes of all animals not fit for the uſe of man, and all the offals, blood, and inteſtines of ſuch as are ſo uſed, ought to be diſpoſed of in this way. The blood and garbage of one fat cow, if carefully preſerved, and duly mixed with half-dry moſs, would be ſufficient to make four or five tons of dung. If only the one-half of that ſubſtance were ſo applied, many thouſands of tons of more dung might be made every year. Moſs is to be found within a moderate diſtance, in almoſt all parts of Scotland; yet the blood and garbage of cattle ſlaughtered, even in country towns, where moſs could be found often within half a mile, are generally thrown to the ſtreets, to find their way to the rivulet. It is not uncommon in a dry warm day, to ſee the ſewers along the ſide of a ſtreet, filled with clotted blood, which remains till the rains waſh it away. Much of the dung found in the belly of the animal, is, with her calf, if ſhe has one, diſpoſed of in the ſame manner; or, if any part of them be carried to the butchers' midding, probably in the centre of the town, the dogs ſoon ſcatter them over every ſtreet and lane: an intolerable nuiſance, and extremely injurious to the health of the inhabitants; and which gives but an unfavourable idea of the police of the place, and the manners and taſte of the people. Their health, comfort, and pecuniary intereſt, would be much promoted, by mixing the blood and offals of every beaſt that was ſlaughtered, with moſs-earth.

Many cows, ſheep, and other animals, die every year, unfit to be eaten, and their carcaſes are generally ſuffered to remain where they fall; or, if at all removed, it is only to the next ditch, where they ſerve for food to the ravens, dogs, &c. and poiſon the air. The quantity of dung ſuch carcaſes would make from moſs, would be very conſiderable, while their peſtilential effects on the atmoſphere would be prevented. No deſcription of manufacture could yield ſo large a profit, as that here recommended. Dung, before it can be brought to the field, muſt coſt 10s. or perhaps 15s. ſhillings per ton, while from the mode here mentioned, it may be made for leſs than a ſhilling per ton, and, if a juſt value is only put upon the other advantages to be derived from the practice, at much leſs than nothing.

It was truly patriotic in the Highland Society, to offer premiums for further diſcoveries, as to the mode of making moſs undergo the putrid fermentation. Every perſon who has the good of his country at heart, will ſincerely wiſh that their ſucceſs may be as great as their benevolent intentions are praiſe-worthy. But till ſuch diſcoveries are made, we ought to perſevere in the uſe of what is already known. The modes of forming moſs into dung, are by no means deſpicable, if farmers and others could only be prevailed upon to reduce them to practice. Induſtry is the chief thing wanted. By the different methods that have been pointed out, of forming dung from moſs, the inhabitants of Avendale, who have moſs in every farm, often in every field, might increaſe their dung to more than four times its preſent quantity, and thereby, in a few years, more than double the produce of other lands. Induſtry is all that is neceſſary to accompliſh this end. While the Highland Society are offering rewards for new diſcoveries, I would recommend to the great land proprietors who have moſs on their eſtates, to offer premiums to ſuch of their tenants, as ſhould ſet the beſt example of induſtry in the modes already known, and appoint a perſon ſkilled in theſe matters, to teach them how to reduce them into practice.

Many of the inhabitants of Avendale, who have been looked up to by their neighbours, as moſt knowing and ſagacious, have long reprobated the uſe of lime as a manure, alleging it injured their lands. But all of them own the utility of dung, which them and their fathers have uſed as manure from time immemorial. The high price of lime, great expence and toil of carriage, want of good roads, unſkilfulneſs in carting, unpleaſantneſs to handle, fear of running riſk, &c. ſtill ſerve to keep up, with ſome, the prejudice againſt lime. Here then is a ſpecies of manure every way ſuited to the taſte of the inhabitants. It can be obtained in almoſt every field, the carriage ſeldom more than a ridge's length, no roads needed, ſoft and eaſy to handle, no riſk to run, no money to advance. This ſpecies of improvement muſt be every way to their wiſh, and I ſincerely hope and truſt, they will ſoon enrich themſelves by it.

I cannot leave this part of the ſubject, without taking notice of ſome errors, which ſome of the learned authors, who have written on moſs, have gone into, and how they differ in opinion from each other.

It will be ſeen from the paſſages that have been quoted above, from the writings of the Earl of Dundonald, that moſs-earth, when mixed with lime, is turned into excellent manure. This, however, is controverted by Lord Meadowbank, who ſays, Eſſay, vol. ii. p. 150. "*Peat prepared with lime alone, has "not been found to anſwer as a good manure. In one "inſtance, viz. in a bit of fallow ſown with wheat, it "was manifeſtly pernicious.*"

It has alſo been ſeen in the paſſages quoted from the Eſſay of Lord Meadowbank, that moſs-earth, when mixed with about one-third of its weight of freſh dung, heats and ferments, ſo as to overcome the antiſeptic and inſoluble qualities of the moſs, and thereby reduces it to a manure, equal or ſuperior to ordinary farm-yard dung. This aſſertion, however, as well as that of the noble Earl, as to lime having the ſame effects, are controverted by the learned Dr. Walker, in his Eſſay on Peat, ſo often quoted. He ſays, page 54 and 55, "When vegetable ſubſtance has "paſt through the venous, the acetous, and putrefactive "fermentations, it is then incapable of having theſe "proceſſes again renewed in it. Much peat, eſpecially "that of an ancient date, having been completely "putrefied, cannot therefore be again ſuſceptible of "any putrefaction. Some peat, indeed, appears to "have been left only in a half putrid ſtate, which "may be concluded, from the branches and roots it "contains, that ſtill retain their natural form, though "their ſubſtance is decayed. But this peat having

“ lain for ages in moſs-water; having become bituminated, and, in conſequence of this, powerfully antiſeptic, it appears to be as incapable as the former of any further proceſs of putrefaction. If recent vegetables, or freſh dung, be intermixed with peat, they will ferment and become putrid, and, by their putrid effluvia, impregnate the peat-earth with fertilizing matter, *but without exciting any degree of putrefaction in the ſubſtance of the peat itſelf.* When lime, or any other calcareous manures are intermixed with peat, they may, by encountering the acid in the peat, occaſion efferveſcence, by which the ſubſtance of the peat may be more minutely divided, and impregnated with neutralized and fertilizing matter. *But theſe manures, though capable of efferveſcence, are themſelves incapable of putrefaction, or of communicating that proceſs to peat, or any other ſubſtance, that is not ſuſceptible of it.* Accordingly, peat-earth and lime, both in its mild and cauſtic ſtate, were mixed in various proportions; ſome of theſe mixtures were expoſed to the open air for one, and others for two years, *yet no degree of putrefaction in the peat-earth could be diſcerned; for though peat conſiſts chiefly of vegetable matter, yet it is in ſuch a ſtate, as to reſiſt the ſeptic power of lime.*”

Here then we find Lord Meadowbank, differing in opinion from the noble Earl Dundonald, and the Profeſſor of natural hiſtory differing from both. Where men ſo eminent for abilities and erudition differ ſo far, it might appear preſumptuous in me to offer to decide. It may ſeem arrogant in one ſo little converſant in chemiſtry, to argue with a learned Lord, and a learned Profeſſor, both ſo deſervedly held in great eſteem. But they will forgive me for entertaining opinions different from both, as to the effects of lime, in overcoming the inſoluble qualities of peat-earth. I found that opinion not merely on what I have read in the works of the noble Earl Dundonald, Dr. Garnet, and others, (the beſt qualified to judge on ſcientific principles,) but my belief is alſo confirmed by ocular demonſtration, in many repeated inſtances, and corroborated by the teſtimony of many intelligent farmers, who have alſo made the experiment. And though ſuch people could not reaſon on chemical principles, they were amply qualified to obſerve the effects of ſuch manure. I have found ſeveral farmers in Avendale, and many more elſewhere, who have made trial of this kind of manure, and I have never yet met with one who did not atteſt its powerful effects. I would be cautious of receiving the ſtories of country people, in oppoſition to well known principles of ſcience; but as little can I liſten to theory, when its runs in oppoſition to well known and well atteſted facts, where it was impoſſible any deception could be uſed, or the ſucceſs proceed from any other cauſe. From the authority of the firſt chemiſts of the age, corroborated by a cloud of witneſſes, in different counties, who have brought that deſcription of manure to the teſt of experience which could not err, and from my own ocular demonſtration, I ſcruple not to aver, that hot lime operates powerfully, in rendering the moſs-earth ſoluble, and thereby converting it into a valuable manure, to any other ſoil.

The fact being indiſputable, it is of leſs importance to the practical farmer to have it fully accounted for on ſcientific principles. It might even look preſumptuous for one confeſſedly little acquainted with chemiſtry, to attempt to make ſuch an explanation. But it does not ſeem to require correct ſcientific knowledge, to account for the effects of hot lime on vegetable matter. Every man who has paid the leaſt attention to the powers and effects of cauſtic lime, when applied as a manure, muſt have learnt, that it and all other calcareous manures, being themſelves void of fertilizing matter, only promote vegetation by the effects they produce on the vegetable matter already in the ſoil. It is in the ſame way it takes effect on moſs. The calcareous matter in the hot lime, engages the acid in the peat, brings on heat and fermentation, and thereby generates a neutralized matter, which greatly promotes vegetation. The fermentation, or effervescence, brought on by the calcareous matter, encountering the acids in the peat-earth, not only forms a fertilizing ſaline matter, which powerfully advances vegetation, but it alſo reduces the antiſeptic quality of the moſs, and renders it ſoluble, while at the ſame time it rapidly breaks the fibre and texture of the moſs, divides it minutely, and thereby reduces it to a manure. Even Dr. Walker himſelf admits the powers of calcareous earths in promoting putrefaction of vegetable ſubſtances. He ſays, Eſſay, page 24th, "*Calcareous earth is well known to promote the* "*putrefaction of vegetable and animal ſubſtances.* The "iſland of Liſmore is, for the moſt part, compoſed of "limeſtone. All its moſſes are much intermixed "with calcareous earth. *They are therefore the moſt* "*putrid, and moſt conſumed of any that are to be ſeen.*" The ſame effects will follow every where, and if moſs be rendered ſufficiently putrid, it will prove the beſt of manure.

I have juſt as little difficulty in aſſerting, that when moſs is mixed with a proper quantity of dung, in a ſtate of fermentation, or capable of becoming fermented, the fermentation of the dung is communicated to the peat-earth, which overpowers its inſoluble qualities, and forms it into manure. The authority of Lord Meadowbank, might ſurely be held good on this ſubject. Few are better qualified to make experiments, either in agriculture, or in chemiſtry. The pains he has beſtowed for ſix or ſeven years previous to his publiſhing his obſervations, and his ample ſucceſs, are ſufficient authority to warrant the aſſertion he has made, and which I well believe, and have no difficulty to repeat.

But it is not on his authority alone I make the aſſertion. It is now upwards of thirty years ſince I ſaw the ſame thing done to a great extent, on the farm of Mains of Grougar above-mentioned. I have done it myſelf, and recommend it to others, and never ſaw it fail of ſucceſs. Lord Meadowbank, who was ignorant of the experiments made by the late Mr. Arnot, or others in this part of the country, has not only the full merit of that diſcovery, but of inveſtigating and laying it open to a ſcientific point of view. And I have ſeen ſo many practiſe it ſince his Lordſhip's remarks were made public, that every thing ſaid, or that can be ſaid againſt it, will go for nothing with me. Dr. Walker, who differs from this opinion, ſeems to be too anxious to reduce every thing to chemical principles. He ſays, Eſſay, page 25th, " It is neceſ-" ſary that the above, or any other opinion concern-

"ing the origin of peat, ſhould exactly correſpond "with the chemical principles which are found in the "ſubſtance." But without throwing contempt on ſcience, I cannot receive it in oppoſition to ſuch plain and incontrovertible facts, during an experience of 30 years.

Dr. Walker, indeed, tells us, that putrefaction has already proceeded ſo far on the generality of moſs, that it cannot be again renewed by lime or dung. But it does not appear to me, that putrefaction is at all complete upon any moſs. The antiſeptic qualities reſiſt and retard putrefaction, hence the moſs accumulates. If putrefaction advanced on moſs plants, as it does on all other vegetables, we ſhould have no moſs-earth whatever. Wherever putrefaction has completed its courſe, no moſs-earth can remain, and wherever moſs-earth exiſts not fully diſſolved, putrefaction has been retarded, and is not complete. The cauſtic lime, the fermentation by a mixture of dung, recent vegetables, animal or ſaline ſubſtances, &c. removes and deſtroys the antiſeptic qualities of the moſs, revives putrefaction which it had retarded, and thereby renders the moſs-earth ſoluble, or, in other words, converts it into manure. Moſs-earth, even according to Dr. Walker's own theory, is wholly compoſed of vegetable matter not completely diſſolved, but rendered ſtationary by its antiſeptic qualities. To talk of putrefaction being complete, while ſo much of the vegetable ſubſtance remains undiſſolved, ſeems altogether inconſiſtent, and quite unaccountable.

When timber, utenſils, human bodies, or ſuch like, have been enveloped in moſs, before putrefaction had completely diſſolved them, the moſs puts a ſtop to the further progreſs of the deſtroyer, protects the things depoſited in it, and keeps them nearly ſtationary for any length of time. But no ſooner are ſuch trees or other ſubſtances dug from under the moſs, than putrefaction begins where it left off, and ultimately diſſolves their whole frame. It is juſt ſo with the vegetable matter of which the moſs is compoſed. Whenever the cauſes of inſolubility are removed, or overpowered by any proceſs or ſubſtance whatever, putrefaction, which it had retarded, begins to operate, and proceeds in its courſe, till not only the whole frame of their vegetable fibre is completely loſt, and the plant formed into earth; but, till the laſt particle of the moſs-earth is alſo entirely diſſolved, and the whole ſubſtances of which it was compoſed, are reſtored to the elements from which they had been collected by vegetable organization.

It is true, that neither calcareous earth, nor any other ſubſtance, can ever communicate putrefaction to ſubſtances incapable of that proceſs; but, it is not true, that moſs-earth is incapable of being further diſſolved by putrefaction. If it were, the inquiries of the Highland Society on that ſubject, would be to no purpoſe; their prize medal loſt, and the labours of Dr. Walker, a mere humbug. If moſs-earth were incapable, as he alleges, of being further diſſolved by putrefaction, it would be altogether uſeleſs, either as a manure, or a productive ſoil.

That cauſtic lime will operate upon moſs in every ſtate in which we find it, is evident from the effects it has upon other ſoils. When land has been often manured with dung, part of the vegetable matter, both of the dung, and that in the ſoil, becomes inſoluble, and yield no food for vegetation. Hence we often find abundance of vegetable matter in the ſoil reduced entirely to earth; yet ſo inſoluble, as to be of no manner of uſe to vegetation. What is the remedy in this caſe? Hot lime moſt undoubtedly. The cauſtic lime, when applied to land in that ſtate, reduces the inſolubity of the vegetable ſubſtance, and forces its dormant powers into action. In this caſe, the putrefaction of the vegetable matter has proceeded much further than it has done in moſs. Nothing of the vegetable fibre, or texture of the plant remains, nor is even a black unmixed earth to be found there as in moſs. Nothing remains of the vegetable ſubſtance, that is perceptible to the eye; yet enough will be found of the inſoluble vegetable matter for the cauſtic lime to act upon. And ſuch are the powers of hot lime, in reducing even that imperceptible remains of vegetable ſubſtance, that the moſt luxuriant crops of grain are always produced when hot lime is applied to ſuch a ſoil. It would be ſtrange, indeed, if lime in a cauſtic ſtate had ſuch powerful effects on vegetable matter, ſo far advanced in putrefaction, and yet had no ſuch powers upon moſs, where putrefaction made ſuch progreſs. If it were admitted, that hot lime had no ſuch effects on moſs, the reaſon muſt be very different from that aſſigned by Dr. Walker. But fortunately for mankind, he is not correct in that opinion.

Moſs as a Soil.

THE properties of moſs-earth as a ſoil, may be conſidered under three ſubdiviſions, viz. for *paſture*, for *planting*, and for *cropping*. I ſhall treat of each of theſe in their order, after having conſidered that neceſſary preliminary to the whole,

Draining of Moſs.

WHETHER moſs land be deſtined for paſture, for planting, or for raiſing of grain, draining becomes neceſſary, as a preliminary operation. If the water that happens to ſpring up from below, or to fall from the clouds, is ſuffered to remain ſtagnant on the ſurface of the moſs, it will completely baniſh every rich and palatable herb, and ſuffer nothing but moſs-fog, and the leaſt valuable of moſs-plants, to grow. The introduction of the moſs-plants, and origin of the moſs-earth, it has already been ſhown, may frequently be traced to that very cauſe. Even where the moſs-earth has riſen to any depth, the richneſs or ſterility of the herbage which it produces, as well as the rapidity of its accumulation, will ever be found to be in exact proportion to the dryneſs or humidity of the ſurface. If water is permitted to riſe over the moſſy ſoil, it becomes ſoft and deep, and quite unfit to bear the feet of men or cattle. Every ſweet and nutritive plant diſappears, and the worſt of moſs-plants are the only produce. The poor animal doomed to live on ſuch paſture, muſt wade to the belly, when gathering its ſcanty and little nouriſhing food. But if proper channels are opened to carry off the redundant moiſture which this humid climate produces, the moſs-fog will ceaſe to grow, the ſoil will become more ſolid, and will ſoon be covered with a richer and more palatable herbage.

This ſuperabundant moiſture, ſo pernicious to moſs-ground, when uſed as paſture, is no leſs ſo, when the ſoil is to be laboured and cropped, or when planting is to be reared. In all caſes, and to whatever uſe moſs is to be turned, if it be not relieved from ſtagnant water upon its ſurface, it will be found incapable of producing any uſeful plant.

But though it is in every caſe neceſſary to free the ſurface as much as poſſible from water in a fluid ſtate; yet it is ſeldom neceſſary, or attended with advantage, to form covered drains of any kind in a peat-ſoil. In general it is only the ſurface that needs to be relieved from ſtagnant water. Except in ſome of the very deepeſt and ſofteſt of *flaws*, where the ſurface of the moſs has not ariſen ſo much above the ſurrounding ground, as to render it as ſolid and dry as the nature of the moſs-earth is capable of; or where ſome ſpring ariſes, no other draining is neceſſary, than merely to form ſuch furrows or channels, as will completely relieve the ſurface of the moſs from ſtanding pools of water. Wherever the moſs has any tolerable declivity, or has become ſolid like bent-moſs, the furrows or channels need only to be dug a few inches deep, not more than would be requiſite to relieve any other ſpecies of ſoil of ſtagnant water on its ſurface. Even in the level flaw moſſes, the ordinary furrows ſhould in no caſe exceed 8 or 10 inches in depth, only the croſs-drains, into which the furrows empty themſelves, may, if the moſs be level and ſoft, be dug ſomewhat deeper.

When a moſs-ſoil is to be uſed for paſture, or for planting, it would be proper to open as many furrows or channels, as completely to remove every poſſible drop of ſtanding water from every part of the ſurface. The number, depth, and order of the open furrows for that end, will depend on local circumſtances, which will be found to vary ſo much, as to render it difficult to offer any general directions that could apply in all caſes. Frequently part of that draining might be performed with the plough in ſummer, and where that cannot be uſed, the draining ſpade muſt be had recourſe to. Where the moſs is to be brought into culture for grain, it is neceſſary to form the ridges and furrows ſtraight, and in regular order: but where the ſoil is to be merely converted into paſture, it may be better, in moſt caſes, to draw the furrows in the way to relieve the ſurface moſt completely at leaſt expence. The water-courſes in moſs, where only a ſmall quantity runs, are much obſtructed by the moſs-fog, and other moſs-plants, which riſe in the wetteſt of moſs. That ſpecies of growth converts the ſmall water-courſes into broad gutters of water, and of moſs-fog, in which the poor ſheep ſinks to the belly every time it has occaſion to paſs from one of the intermediate hillocks to another, in ſearch of its food. A plough-furrow, drawn in time of drought, in the line of theſe gutters, or if the plough horſes cannot be ſupported, a ſmall channel opened with a ſpade, would relieve the gutters of ſtagnant water, and render them paſſable by the ſheep at all times, as will be noticed when I come to treat of moſs as a paſture.

When moſs is to be laboured, and cropped with grain, the utmoſt care ought to be taken to form the ridges, ſo as to relieve every part of the ſurface of water in a fluid ſtate. The ſucceſs of the moſs culture depends much upon proper attention being paid to theſe circumſtances. If either the ridges or furrows are formed with alternate heights and hollows, the crop will miſgive, one part will be drowned, and another will periſh for want of moiſture.

The ſoft, damp, ſpungy nature of moſs-earth, has induced many to think, that draining, and underdraining the moſs, was neceſſary to render it ſufficiently dry and ſolid. All the authors who treat of moſs-culture, whoſe works have fallen into my hands, ſeem to think, that theſe defects in the moſs as a ſoil, may be remedied by a complete ſyſtem of draining. Dr. Anderſon, and the anonymous author who deſcribes the moſs culture in the neighbourhood of Swenridge-muir, give directions how to form main-drains, maſter-drains, ſmall drains, at right angles; and the doctor propoſes trenching the whole ſurface of the moſs two feet deep, in order to relieve it from too much moiſture. But with all reſpect to their ſuperior abilities and erudition, I beg leave to repeat, that unleſs where a ſpring happens to ariſe, no other draining is neceſſary, than merely relieving the ſurface of the moſs from ſtagnant water. The moſs is indeed a ſoft ſoil when it is drenched in water, but that defect will not be remedied by draining. The moſs ſoil is alſo too ſoft when dry. Though it be a very ſoft earth, yet it is ſo extremely cloſe, compact, and adheſive, that water does not paſs or filtrate through it nearly ſo much, as it does through any other earth. Water will more readily find its way through a bed of clay, than through one of unbroken moſs. A partition of moſs that has not been broken by external force, though only a few inches in thickneſs, will retain water like a caſk. The draining and under-draining, therefore, which theſe authors ſo much recommend, can have no effects beyond the very limits of the drain. The beſt conſtructed drain would not remove the water lodged in the unbroken moſs, at only a few inches diſtance from the drain itſelf.

But were it otherwiſe, ſuch under-draining would render the moſs incapable of producing grain. For though it is a wet ſpungy earth, that receives and retains without fluidity, a much greater quantity of water than any other earth; and although while it remains entire, it retains its coheſion and firmneſs even in water; yet when it is once broken, and mouldered into a ſoil, (and it muſt be ſo mouldered before it can produce grain,) it then becomes by far too light, open, and porous, and too eaſily parts with the moiſture neceſſary to ſupport vegetation.

It is true, that even when moſs is pulveriſed into a vegetable mould, it ſtill takes in, and retains without fluidity, a larger quantity of water than any other earth can retain; but it is equally certain, that it very readily parts with that moiſture, both by filtration, and exhalation. However much the moſs-earth may be overcharged with water, a few days of drought will diveſt a pulveriſed peat-ſoil of moiſture, to a greater depth than the roots of the grain can reach. If once moſs-earth is pulveriſed into a ſoil, it more eaſily parts with moiſture than before the tenacity of the moſs was broken. The conſequences are, the crop ſuffers for want of ſap, and if the drought happens to be ſevere, and of long duration, it muſt be totally loſt; eſpecially if the drought happens when the corn has nearly attained maturity. For though the corn when in the blade, may, without a due ſupply of moiſture in the ſoil, ſupport itſelf, ſo as to keep alive, on what it can collect from the atmoſphere, by means of its blades; yet when the plant has attained greater maturity, and the leaves have loſt their power of abſorbing the aereal fluids, the want of moiſture in the ſoil muſt be more ſeverely felt; and if the drought be great and of long continuance, the crop muſt be completely loſt.

Dr. Anderſon, after having ſpent near 20 pages in pointing out the neceſſity of draining and trenching two feet deep, to relieve the moſs of redundant moiſture, comes at laſt to reaſon more correctly on the ſubject. As his ideas comes at laſt to coincide with my own, I cannot better expreſs my mind on this ſubject, than in the words of the learned doctor. "Moſs when thus reduced to a dead ſtate, to a ſuffi-" "cient depth, is in little danger of ever being too" "damp, unleſs the main-drains are choked up, ſo as" "to force the water to riſe very near to, or above the" "ſurface. Indeed, if no manure be given to it, moſs" "is never extremely productive, either of graſs or" "corn, unleſs it be kept moderately moiſt at all" "times. The ſoil is of itſelf ſo light, that, when dry,

“ it ceaſes to give nouriſhment to any uſeful plant “ whatever. Such dry moſs produces little elſe than “ the narrow-leaved ſorrel, (*Rumex acetoſella*,) and “ if ploughed and ſown with oats, though the corn “ may ſpring up and appear healthy enough for ſome “ time; yet when it gets into the ear, it becomes weak “ and ſoft in the ſtalk, and falls over and withers, be- “ fore there can be the ſmalleſt mark of kernel in the “ grain. This diſeaſe is well known in all moſs coun- “ tries; and as it was originally believed to be occa- “ ſioned by witchcraft, the name ſtill remains, it is “ called witched corn. If, on the contrary, the land “ be laid flat, and it be kept moderately moiſt, without “ being wet, it produces excellent corn and graſs.” Pages 99 and 100.

I moſt cordially agree with the learned doctor, in every thing he ſays, in the paragraph here quoted. But I leave it to him to reconcile what he here ſtates, with the under-draining and trenching he ſo much recommends, in upwards of a dozen of pages preceding the paſſage quoted. The doctor's ſuperior ingenuity may be equal to the taſk, but to me they ſeem irreconcilable.

Dr. Anderſon, and others, ſeem to have been drawn into that error by looking at the extreme ſoftneſs of moſs-earth. But they ought to conſider, that that defect in a moſs-ſoil, is, in ſome meaſure, incurable. Moſs is no doubt too ſoft when wet, but it is alſo too ſoft when it is dry. Want of firmneſs and ſolidity, is certainly the greateſt defect of a moſs foil; but its capacity of taking in, and retaining a larger portion of water, than any other earth, is the greateſt excellence which that or any other ſoil can poſſeſs. If any method would be fallen upon to make the moſs more retentive of water, it would be of much advantage. But to uſe means to facilitate the departure of its moiſture, is to add to its greateſt defect. Underdraining, trenching the ſoil, and every operation whatever which has a tendency to drain the moſs of ſap, beyond merely relieving the ſurface of ſtagnant water, is highly injurious to the ſoil, and will not remedy its defects.

Dr. Anderſon himſelf ſeems, in ſome part of his treatiſe, to be perfectly ſenſible of this, and he even points out a remedy for it. Yet, in other parts of the ſame work, he goes on to recommend draining, underdraining, and trenching; operations which cannot fail to counteract the remedies he has pointed out, increaſe the evils he propoſes to cure, and to render the corn *witched*

In pages 100 and 102, he ſays, " No bottom is " better for a moſſy ſoil, than quick-moſs. When " the plants are eſtabliſhed upon the ſoil in the ſpring; " theſe, by their roots and leaves, attract moiſture " both from above and below, ſo as to keep the ſur- " face in a due ſtate for promoting vegetation. Even " during the greateſt drought in ſummer, the moſs- " earth (by which he means the ſoil,) which lies next " to the quick-moſs, (the ſolid unbroken-moſs) is " kept perfectly moiſt, ſo that the roots which pene- " trate down to it, find always abundant moiſture to " keep the ſurface mould in a proper ſtate for promot- " ing vegetation. But that this effect may be fully " felt, the ſurface of a moſſy ſoil ſhould be laid per- " fectly flat, and as ſmooth and even as poſſible.

“ It ſhould on no account be laid up into ridges, but
“ ploughed into broad lands, without any furrows at
“ all, or with as few as may be; for as the whole
“ moſs-earth, for two feet deep, is in fact one contin-
“ ued covered drain, not one drop of hurtful water
“ can be allowed to remain on the ſurface, but ſinks
“ directly down till it reaches the quick-moſs, from
“ whence it will readily find its way to the main-
“ drain of the initatory operations ſhall have been
“ properly conducted.”

The initatory operations which Dr. Anderſon here refers to, are forming various drains in the moſs, and trenching its whole ſurface two feet deep, that the water may ſink from the ſurface to theſe drains. It is only in what the doctor here terms “ initatory operations,” that I conceive he is wrong. If the water will too readily percolate through the moſs that has been once broken and mouldered down to a ſoil, (and that it will do ſo cannot be doubted,) why, in the name of wonder, ſhould that ſoil be formed two feet deep from the ſurface, and communications be opened with drains ſtill deeper? The doctor informs us, that the unbroken moſs (which he calls quick-moſs,) below that which has been trenched, will contribute to keep the ſoil ſo moiſt, that the roots which penetrate to that ſolid damp moſs, will be abundantly ſupplied with ſap. But what vegetables are they that can reach their roots through two feet of trenched ſoil, to gather moiſture from earth below? The parſnip may, when full grown, but neither corn nor graſs can extend their roots beyond the fourth part of that depth. If ſpungy wet unbroken moſs, be ſo neceſſary to ſupply the roots of plants with moiſture, that is not to be found in ſufficient quantity in the broken pulveriſed ſoil above where can be the propriety of placing that relief more than four times the diſtance they can reach? It is not neceſſary that any ſoil, ſave a garden, ſhould be formed two feet deep. In a ſoil ſo incapable of retaining moiſture as peat, it would be the worſt of economy.

The bad effects of digging or trenching moſs, more than the depth of an ordinary ſoil, have been felt wherever it has been practiſed. The difficulty of raiſing grain from moſs ground abounding with deep hags, and of uneven ſurface, is well known. If only the tops of the hillocks between the hags are laboured, they will be found to be incapable of producing grain from the want of moiſture. If the ſurface is levelled, and the hags and gullies filled up, the water will ſo eaſily percolate through the broken moſs, that has been thrown into the low places, that vegetation will not be properly ſupported on the ſurface. Hence the cultivation of deep haggy moſs has often miſgiven, and is certainly, from that very cauſe, much more difficult than moſs that is nearly level.

The enlightened Earl of Dundonald, obſerves (p. 33d of his Treatiſe, on the connection between chemiſtry and agriculture,) that at no time, in this humid and northern climate, can peat ſoil be diveſted of the ſuperabundant proportion of moiſture, with which it becomes charged in the rainy ſeaſons.

The noble Earl muſt, no doubt, mean the great body of the moſs, and not its cultivated ſurface. But it is of ſmall importance to the cultivator, what moiſture may be in the maſs of peat-earth below, if the ſoil on which the grain is raiſed be ſo deſtitute of ſap, as to be incapable of ſupporting vegetation.

But to ſum up all on the ſubject of draining, I repeat, that moſs-earth is quite incapable of ſupporting grain, until its texture is broken, and the moſs pulveriſed into a vegetable mould, by mechanical labour; the viciſſitudes of the weather, and operations of manure. That whenever the moſs-earth is ſo reduced, and pulveriſed into a ſoil, it becomes ſo open, light, and pervious, that the water too eaſily finds its way through it to the under ſoil, and the ſun and dry winds, as eaſily exhale the moiſture from it, to ſuch a degree, that it becomes incapable of ſupporting plants with that indiſpenſably neceſſary article of their food, a due proportion of water. This being the caſe, I conclude, that all draining, under-draining, trenching, over-deepening the ſoil, and every operation whatever which facilitates the filtration or exhalation of moiſture, or places it beyond the reach of the roots of the crop, are all extremely hurtful, and ought to be carefully avoided. Let me alſo repeat, that the only draining that is neceſſary for moſs, or that can be performed without injuring the crop, is merely to carry off from the ſurface of the moſs all ſtagnant water. All further draining ought to be guarded againſt, as the ſin of witchcraft. Inſtead of trenching, which has a tendency to render the ſoil too deep, too light, open and permeable, every thing ought to be done to render it more ſolid and more retentive of moiſture. Mixtures of clay, ſand, or any ſolid earth, manures. Rolling when wet, &c. are the operations beſt calculated to give ſolidity to the moſs ſoil make it retentive of ſap, and prevent the corns from becoming witched.

Moſs Soil conſidered as Paſture.

MOSS is generally paſtured with ſheep, but it is well known to be only a miſerable, and very unpalatable ſubſiſtence, which that valuable animal can gather from ſuch a ſoil, until it is meliorated by cultivation, which has not as yet been much attended to. It has already been noticed, that wherever moſs has once fixed its ſeat, no pains have been taken to interrupt its growth; and what is, if poſſible, ſtill more ſurpriſing, ſcarcely have any means been uſed, either to increaſe the quantity, or better the quality of its paſture; though it is well known, that the herbage growing on uncultivated moſs is capable of great improvement, and the condition of the poor animal that feeds on it, might be much meliorated at a ſmall expence.

Every ſtoremaſter who poſſeſſes moſs-paſture, will readily admit, that, by cutting open channels for the water in all the low gutters, where it remains ſtagnated with moſs-fog, the herbage would be much increaſed, and its quality greatly improved. Yet ſuch is their inattention to that neceſſary and profitable ſpecies of improvement, that few ſuch drains have yet begun to be formed in the weſtern counties of Scotland. The poor ſheep is ſtill doomed to wade to the belly in gutters of ſtagnant water, and yellow fog, in which many of them periſh every year; though at the expence of a few ſhillings, perhaps, ſeveral acres of moſs might be laid ſo dry, that the ſheep would not ſink over its hoof, the quantity of the herbage would be multiplied, and its value more than doubled. The draining neceſſary for muir paſture might eaſily be executed in the courſe of a few years, by the ſhepherds, without interfering with their duty to their flocks. The herds, however, generally prefer loitering on the muirs, either altogether idle, or only knitting ſtockings, by which they can only gain twopence, or threepence per day. Could the ſhepherds be only prevailed upon to lay aſide the ſtocking-wires, throw off their plaids, and take up the draining-ſpade, they might, beſide tending their flocks, each of them gain two ſhillings every day to themſelves, and a vaſt deal more to their maſters and the proprietors. William Dykes, of Lambhill, Eſq. being convinced of the utility of draining the gutters in his ſheep-walks, engaged a man acquaint with that kind of work, who opened the drains with ſuch facility, that at 3 farthings per fall in length, he gained from 4s. to 5s. per day. The herd on the muir, tempted by the profit, ſolicited the job; but ſuch is the force of indolent habits over thoſe who have been inſlaved to them, that the herd never gained more than 8d. or 10d. by draining. Finding the labour irkſome, he returned to his plaid, and his ſtocking-wires, like the Hottentot to his pudding; the draining ſpade has been ſuffered to periſh by ruſt, and the poor ſheep continues to wade the gutters as formerly.

In many ſituations, the paſture of moſs ground might be greatly increaſed and enriched, by flooding clay, earth, or ſand, upon the moſs, by means of ſtreams of water. Where that is impracticable, theſe might be carted on the moſs, in time of drought or in froſt. The ſurface of the moſs once laid dry, a ſmall quantity of ſand, earth, clay, &c. from the neighbouring heights, would greatly improve the paſture, both in quantity and in quality. Even a few acres ſo dreſſed every year, would ſoon raiſe the ſheep walks to double their preſent value. But curling ſeems to be much more congenial to the temper of the people. Lime abounds in the mults on the *Aven*, and marl is known to abound in ſome of them. A dreſſing of theſe with the ſand or earth here recommended, would improve the paſture to ſuch a degree, as moſt amply to indemnify the expences. It is well known, that a dreſſing of hot lime will inſtantly baniſh the heath, bents, and moſs-plants, and raiſe in their ſtead, a rich carpeting of white clover, daiſies, and richeſt poa graſſes, on the bleakeſt muirs in Scotland.

Even the cleanings of roads and ditches, when ſpread on a muir ſoil of the worſt kind, will inſtantly change the heather and ling into the richeſt herbage. But it would be in vain to apply any of theſe to a ſoil that had not been relieved from ſtagnant water. Manure may as well be thrown into the ocean, as applied to any ſoil that has not been relieved from water in a fluid ſtate.

Draining, top-dreſſing, and manure, inſtantly change the nature of the herbage, as well as better its quality. This, however, ought not to be altogether left to chance. Every uſeful graſs, or plant, which the ſoil can ſupport, ought to be introduced and cultivated. The cotton-head or moſs-cropt, and draw-ling, ſhould be planted and encouraged in every moſs ſoil, as they yield a rich ſupply of green food early in ſpring, and long before any other graſſes riſe. The *Holcus lanotus*, or hoſe-graſs; the fly bent; dog-tail-graſs; various tribes of the *Avana*, or corn graſſes, and others, the moſt proper for hay or paſture, ought to be introduced and carefully cultivated, to improve the paſture. Broom and whins, ſhould alſo be raiſed in the ſheep-walks, both for ſhelter and for food, in the time of ſnow.

Clumps and belts of planting for ſhelter, are another ſpecies of improvement, much needed in ſheep-walks, and which might be eaſily raiſed to cover the poor animal from the inclemency of the weather, as will be ſhown in courſe.

We frequently ſee proprietors of muir lands, eager to extend their eſtates, by making new purchaſes; and they are generally well ſatisfied, if they can obtain four or five *per cent.* of intereſt on the ſums advanced. But money laid out with judgment in improving the paſture, and cultivating the ſoil of the lands they already poſſeſs, would frequently draw 50, or perhaps, 100 *per cent.*, as well as prove ſources of employment to the labourer, and of wealth to the nation. An eſtate merely paſſing into the hands of another proprietor, is a matter of ſmall importance to the public; but by their improvement, the whole community become gainers. The proprietor or tenant, who improves one muir farm, does more real ſervice to mankind, than he could do by merely purchaſing a thouſand; and if ſuch improvements were conducted with any degree of propriety, the profit they would yield would be immenſe. Yet ſuch is the prejudice (in this part of the country at leaſt) in favour of purchaſing, and againſt improvement, that the perſon who ſhould propoſe to lay out the price of one farm, on the improvement of two or three more, would be accounted a fool, and his credit would be doubted; but it is only a few of the proprietors, or poſſeſſors of land, in this part of Scotland who expoſe themſelves to popular ridicule, by making extenſive improvements on their eſtates.

Plantation on Moſs.

THAT trees might be reared, and brought to conſiderable perfection, even on moſs ſoil, is a matter ſo well authenticated, by the thriving plantations to be found growing on that deſcription of earth in every county in Scotland, that it becomes quite unneceſſary to enumerate inſtances. It is not to be expected, however, that all the different kinds of trees will thrive equally well, in every ſoil and ſituation. If we would expect planting to turn to good account any where, we muſt be at pains to ſelect the ſpecies of trees ſuited to the ſoil, which we devote to that uſe. The ſucceſs of the rearer of foreſt wood, will depend more on his ſkill, in ſelecting the kinds ſuited to the ſoil, and ſituation where he plants, than upon any other circumſtance.

Where plantations are to be attempted on a moſs ſoil, the neceſſity of a judicious ſelection becomes ſtill greater. The depth and quality of the moſs, altitude of its ſituation, humidity of the ſoil, nature and qualities of the ſubſoil, &c. ought to be carefully attended to, and none but trees well adapted thereto, ſhould be planted. In the wonderful economy of nature, trees, as well as graſſes, are provided for almoſt every poſſible diverſity of ſoil, climate, and ſituation; and it is as neceſſary to make a judicious ſelection in planting woods and belts, as it is in cropping the field, or the garden. Room is left for exerciſing ingenuity, and rewards are held out for induſtry, in the one as well as in the other.

A deep flaw-moſs, is certainly far from being the ſoil beſt adapted to the growth of wood; but if ſtagnant water is removed from the ſurface of the moſs, alders, birch, mountain-aſh, poplars, pines, willows, larch, and all other aquatic trees, will grow even in a flaw-moſs, to a very conſiderable ſize. But wherever the moſs lies too thick for the roots of trees to reach the ſubſoil, nothing but aquatic trees can be expected to thrive.

That trees of theſe kinds will attain conſiderable ſize in a moſs ſoil, is evident from their being to be ſeen growing healthy, and with conſiderable luxuriance, in that deſcription of earth, in many parts of Scotland. The ſame fact may alſo be eſtabliſhed, from the immenſe number of trees of theſe deſcriptions, which are found every where enveloped in the middle of moſſes, where it is evident they have grown in the peat-earth, after it had accumulated to ſuch a depth, as to preclude their roots from ever reaching the ſubſoil. Oaks, elms, and other trees of large dimenſions, are never found but at the bottom of the moſs, having evidently grown from the original ſoil, before the moſs began to be formed. But ſeveral courſes of birch, willows, mountain-aſh, and other aquatic trees, are, where the moſs lies deep, generally found with the roots adhering, and extended as they grew in the moſs, ſeveral feet from the bottom of the peat-earth, and altogether above the reach of the ſubſoil. Theſe ſhow, beyond a doubt, that, after the moſs had riſen high over the original ſoil, and the wood which had grown in it, acquatic trees had long continued to grow naturally in the moſs. In ſome places, too, in the Highlands, two, three, and ſometimes four courſes of fir trees, are found in the moſs, at different heights above each other, each courſe having only begun to grow, after the former generation of trees had been overthrown, and the moſs had riſen high over them. It is well authenticated, that, in ſome parts of the Highlands, two or three courſes of fir, are found, at different heights, above each other in the moſs ſtrata; and a fourth generation are now growing ſpontaneouſly on the ſurface. Wherever trees grow naturally, and without protection, they will certainly grow better when planted and encloſed. *

But many of the moſſes are ſo thin, that the roots of the trees can eaſily reach the ſoil below. Where that is the caſe, every ſpecies of trees ſuited to the ſubſoil, will ſtill grow. If the moſs is not more than two feet in thickneſs, and reſts on a ſoil of clay, or ſolid loam, in not more than 800 or 1000 feet of altitude, oaks, elms, aſhes, and other foreſt trees, may ſtill be reared to a conſiderable ſize. If the moſs thinly covers a ſandy, gravelly, or rocky ſoil; aſhes, elms, pines, beeches, &c. are the proper plants.

It is evident, that oaks of vaſt dimenſions, and many other ſpecies of large trees, once grew on the moſt elevated muirs on the Aven, and in almoſt every

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* In Moſs-mulloch, in the pariſh of Strathaven, there are, at preſent, growing ſpontaneouſly, ſome young firs, near 3 feet high, where the moſs is not leſs than 38 or 40 feet deep.

part of the iſland. And though a melancholy alteration in the climate, may prevent them from attaining the great magnitude of thoſe of former ages; yet, wherever wood has formerly grown, it will ſtill grow, * (if the roots can only reach the original ſoil,) though not to the ſame perfection as in former ages. In many thouſands of acres of the muirs of Avendale, and other weſtern parts of Scotland, the roots of the trees may eaſily reach the ſubſoil, ſtill as good for the growth of wood as ever. The flaw-moſſes are capable of rearing aquatic trees. If from the change of climate, or other local circumſtances, they ſhould not now attain that degree of perfection, which they formerly did, in ſuch a ſoil, yet they may, if ſkilfully managed, come to ſuch perfection, as to be fit for country uſes; and, at all events, to ſhelter the ground, and the helpleſs animal, that is doomed to paſture in ſuch expoſed ſituations. This alone, independent of the value of the timber, would be found to be a matter of infinite importance, in ſuch a high, open, and unſheltered country as Avendale, and other muirs in Scotland. I know no way in which the proprietors of muir lands, could lay out part of their fortune to greater advantage, than in rearing clumps or belts of wood in their ſheep-walks. They would ſhelter the ground, prove beneficial to the ſheep, and highly ornamental to the country.

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* " In every place where timber is found, there is always a good " ſoil below, on which the trees have grown. *This ſoil is as good as " ever for the production of trees.* Unfortunately, indeed, in moſt " caſes, it lies too deep. But, where it is not covered with ſo much " as three feet of moſs, it affords a favourable ſituation for planta- " tion." Dr. Walker's Prize Eſſay, page 107.

Culture and Cropping of Moſs.

PEAT-EARTH, not only yields graſs for paſture, and rears plantations, but with proper treatment, it may be alſo made to produce weighty crops of good grain, and valuable roots. But though theſe important facts have now been aſcertained beyond all doubt, yet the cultivation of moſs ſoil has not hitherto been attended to, in any degree ſuitable to its high importance. We are only indebted to accident, for what is yet known on that ſubject. Few who have ever engaged in the culture and cropping of moſs, have been capable of making experiments and obſervations, that could direct their own, or their neighbours' future operations on ſolid principles, or lead to uſeful diſcoveries. One happens by accident, to extend his potato beds, a few feet or yards into the moſs ſoil, and to ſow it with oats next year, and finding a profitable return from both, he repeats the experiment, and his neighbours begin to follow his example. Another with a view to remove the moſs, that he may get at the ſoil which it covers, conſumes the moſs with fire; and the luxuriant crop produced from the aſhes, tempts him and his neighbours to continue the practice. It is only to ſuch accidental diſcoveries, and not to any regular courſe of inveſtigation or experiment, that the culture of moſs-earth in Scotland can be traced.

The greateſt improvements that have been introduced into the moſs-culture of this kingdom, have been imported from Ireland. It has been the practice in that country, for about a century paſt, to plant potatoes in their turf bogs, in the way uſually termed lazy-beds; and they have always had valuable crops of potatoes, and luxuriant crops of corn after them. The Iriſh cultivators had alſo diſcovered, that lime acted as a powerful manure on moſs-earth, and had a tendency to conſolidate the ſoil. The ſucceſs with which this mode of culture was attended, could not fail to attract the notice of ſuch of our countrymen, as happened to traverſe the moſſy parts of Ireland, and they imported them into Scotland. We are certainly much obliged to thoſe who have introduced among us the improvements carried on in that country, but I ſhould have been much happier, to have been able to congratulate my countrymen, on the ſucceſs of *their own* diſcoveries; or, even on their having made improvements on the Iriſh practice. Until further inveſtigations are made by thoſe qualified to do ſo with ſucceſs, it muſt afford much conſolation to every well-wiſher to the improvements of his country, to know, that the modes of culture already known, and beginning to be practiſed in Scotland, are ſuch, as when executed with any degree of propriety, will moſt amply reward the cultivator, and lead to the moſt important improvements. Such information muſt be of the higheſt importance to the proprietors of eſtates, in many parts of this country. It cannot fail to be peculiarly intereſting to the proprietors of land in Avendale, who have ſo many thouſands of acres of moſs, every way capable of being rendered productive, with the means of improvement at hand, yet remaining in an uncultivated ſtate.

To rouſe my countrymen to further exertions in agricultural improvements, and eſpecially in reclaiming the extenſive fields of uncultivated moſs, with which the country abounds, is my ſole aim in writing this pamphlet. If it ſhall contribute in any degree to that end, my utmoſt ambition will be gratified. As I have not for ſeveral years paſt farmed any land, it has not been in my power to make the experiments I might have done, had I occupied land. I have neither ſeen, nor acquired ſuch correct information, as to the improved modes of culture carried on abroad, as to be able to detail them, or ſay which of them would beſt ſuit our ſoil and climate. But having ſurveyed, for ſeveral years paſt, all the moſs-culture within my reach, in the ſouthern and weſtern counties of Scotland, converſed much with the people engaged in theſe improvements, and collected all the information I could; I ſhall detail it to my readers, with ſuch remarks as occur, on what I conſider the beſt methods of *Labouring*, *Manuring*, and *Cropping* of moſs. Taking theſe in their order, I proceed to offer ſome remarks on the beſt method of

Labouring Moſs Soil.

MOSS being evidently an excreſcence, which has grown over a ſoil, for the moſt part much more valuable than itſelf, and the cultivation of the peat-earth being but ill underſtood, the firſt and moſt natural wiſh concerning it, will be, how to remove the peat-earth, ſo as to recover the ſubſoil over which it has uſurped its ſeat. This has been often attempted, by *burning* the moſs down to the original ſoil, and ſometimes by digging it up, and *floating* it off by means of a ſtream of water. Theſe may rather be conſidered as plans of extirpating, than of cultivating moſs. The propriety of them will fall to be appretiated by a compariſon of the value of the moſs-ſoil, with that which it covers, and the facility with which the moſs can be removed. Where the moſs covers a ſoil much more valuable than itſelf, and where it can be cleared away at a moderate expence, that is certainly the moſt proper method of cultivation. But where the ſubſoil does not much exceed in value the peat-ſoil, or where the expence of removing the moſs would more than caſt the balance, it would be wrong to make the attempt.

Burning moſs for the ſake of the aſhes it yields, to be uſed as a manure, will be ſhown to be extreme bad economy. And unleſs where the ſtrata of moſs-earth is but thin, and reſts on a ſubſoil of clay or loam, it would be bad huſbandry to attempt to get rid of it by burning. If the moſs covers a ſandy ſoil, it would be madneſs to burn off the peat earth; as the ſoil would be thereby, after a crop or two, reduced to abſolute ſterility. But where the moſs is thin, and covers a clay or loamy ſoil, burning may be practiſed to advantage. By burning in ſuch circumſtances, you not only exchange a moſs ſoil for one of much greater value, but the clay will be very much improved by the operations of the fire. The mechanical arrangements of the clay will be improved, it will be rendered leſs tenacious, and leſs retentive of moiſture, which are its greateſt defects; and from the aſhes of the peat, the alkaline ſalt it contains, and operations of the fire, it will be partly fertilized.

For theſe reaſons, I ſhould not only recommend the burning of all moſs, which covers thinly a clay ſoil, or is mixed with it; but wherever a poor meagre clay land lies in the vicinity of moſs (which is often the caſe,) I would conſider it good huſbandry, to lay a large quantity of moſs along the crown of every ridge, dig up, or plough part of the clay ſoil, mix it with the moſs, and when both were a little dried, ſet them on fire. The dry moſs would calcine a large portion of the clay. If the burning can be performed in a ſmothered way, and as much of the vegetable matter in the moſs as poſſible prevented from being diſſipated in gas, the effects of the burning will be the more beneficial. At any rate, the burnt clay mixed with the ſoil, will render it more open and pervious, and much more productive for many years to come. But this ſubject will be reſumed when I come to treat of manuring moſs.

Floating off moſs, by means of a ſtream of water, in order to get at the ſoil it covers, has alſo been practiſed in ſome places. But this mode of removing moſs can only be practicable in few ſituations, and it ought never to be attempted, but where the ſuperior value of the ſubſoil is adequate to the expence of floating off the encumbering moſs-earth.

The moſt maſterly undertaking of this kind ever attempted in Britain, or, probably in the world, is that which was projected and begun, on the eſtate of Blair-Drummond, by the truly patriotic Lord Kames, and which has been ſuccesſfully accompliſhed by his ſon, the preſent Mr. Drummond. Many thouſands of acres of beautiful haugh land, ſituated on both ſides the river Forth, above the bridge of Stirling, are moſt unfortunately covered with moſs, from three to fifteen feet deep. This extenſive vale had, in former ages, been covered with growing wood, part of "*Sylva Caledonia,*" mentioned by Tacitus. The innumerable trees which compoſed that wood, are now found under the moſs, lying by the roots from which they ſprung, and theſe roots are alſo found in the ground, with their ſhoots and tendons far extended in the clay, in the very poſition in which they grew. That the cutting of this wood, gave birth to the moſs which now covers it, and the beautiful vale on which it grew, cannot be doubted. And it is equally clear, that the Herculean labour of cutting down theſe extenſive foreſts, has been performed by the Romans. The roads (evidently Roman works,) made through different parts of this extenſive valley, upon the ſurface of the clay below the moſs, the Roman ſtations yet entire in its vicinity, and the Roman utenſils found under it, prove the cutting of theſe woods to have been performed by that enterpriſing people. About 1500 acres of this moſs, forms part of the eſtate of Blair-Drummond. Being flaw-moſs, very deep, of ſmall value as a ſoil, and the ſubſoil being a ſtrong rich clay, Lord Kames, that bright ornament of his native country, planned the ſcheme of floating off the moſs, by raiſing a ſtream of water from the river Teath, in a regular formed canal to the Forth; and by this means, to relieve the rich clay ſoil from the huge load of ſuperincumbent moſs, ſo as it might be cultivated and rendered productive.

For this purpoſe, a wheel was conſtructed on the Perſian model, which riſes from the river, and diſcharges into troughs about 20 feet high, upwards of three thouſand pints of water every minute. The water ſo raiſed, being carried to the moſs, near two miles diſtant, is equally divided among the moſs tenants, who ſtore it up into reſervoirs cut into the ſolid moſs, until it be convenient for them to uſe it. A regular canal, about two feet wide, and eighteen inches deep, being formed on the ſurface of the clay, at the foot of the moſs brae, the water is let into that canal from the reſervoir, and the moſs being dug up with ſpades, is thrown into the canal, which floats it into the river Forth. A break or daſs of the moſs, about ten feet broad, from the ſide of the canal, is uſually taken in, and when that is dug down to the clay, and the moſs floated off, a new canal is formed at the bottom of the moſs brae, and a new daſs or break of the moſs dug up and thrown into it. The average diſtance to which the moſs is thus thrown, from the ſpade into the canal, is five feet; yet when the digging up the moſs, and throwing it into the canal at that average diſtance, is undertaken at a farthing for each cubic yard, the labourer will gain upwards of two ſhillings ſterling per day. As a cubic yard of moſs weighs upwards of ninety ſtones, a labourer will dig up in one day, and throw from his ſpade, to the average diſtance of five yards, about 4,500 ſtones weight of moſs-earth.

The wheel was erected, and the water brought to the moſs, at the proprietor's expence. The moſs has been parcelled out in ſmall lots, of 8 acres each, on leaſes of 38 years, and the tenants were moſtly Highlanders, who had been turned out by their landlords, when the lands they occupied were converted into ſheep-walks. The proprietor gave each ſettler a quantity of meal, with timber, and ſome further aid in building a houſe. The rent was low at firſt, but riſes conſiderably after a fixed period. The colony began to be planted about the year 1768, and it now contains near 1000 ſouls, who, in general, live very comfortably, in neat ſmall houſes, moſtly built of brick. Near 500 acres of this moſs have already been dug up to the clay; and carried off in this manner. As the average thickneſs of the moſs is probably about 8 feet, no leſs than 789,333,000 cubic yards of moſs, weighing upwards of 71,839,970,000 ſtones, muſt have been dug up, thrown on an average to a diſtance of five feet, and carried off by the artificial ſtream of water!

From the lands thus cleaned of moſs, between two and three thouſand bolls of grain are now raiſed annually. Sixty horſes, and between two and three hundred cows, are now ſupported upon a piece of land, which formerly did not yield a penny per acre of yearly rent. Great, indeed, is the honour due to the worthy and venerable patriot who projected the ſcheme, that has relieved ſo many of his fellow-creatures from miſery, and taught them that induſtry by which they have enriched themſelves, and greatly benefited ſociety. The patriotiſm of the father ſhines conſpicuous in his ſon; who, beſides the enlargement of his rent-rolls, has the ſingular felicity of ſeeing his colony increaſe daily in wealth and happineſs, by purſuing the paths of virtuous induſtry, which he and his father have opened to their view. Such conſolations do not fall to the lot of many. I ſhould covet the felicity which Mr. Drummond muſt derive from a ſurvey of his moſs colony, infinitely more than I would do the whole labours and achievements of

Mr. Pitt, or of Bonaparte. I much doubt if either, or both of them, can ſurvey their works with the degree of pleaſure which that gentleman muſt feel, on viewing the people he has rendered happy, and the ſervice he has done to ſociety.

Dr. Walker, in his Eſſay on moſs, ſo often quoted, ſeems to have entertained the ſame ſentiments with me on this ſubject, p. 83. "This is a domeſtic "conqueſt, far preferable to one of a foreign nature. "If this is not patriotiſm, one may be at a loſs to "know what patriotiſm is. The achievements of a "warrior in the field may have a dazzling ap- "pearance, but they cannot, in the eye of reaſon, be "accounted equal to this." And at page 104th, he ſays, "It is not eaſiy to forget one of the laſt viſits "paid by the worthy Lord Kames, to his tenants in "this moſs. They flocked around him, the men, "their wives, and their children, as to a father and "benefactor. Not like other tenants, who are apt to "extenuate their profits; they were anxious to ſhow "their beneficial crops, and how much they had "gained. This was their comfort and his delight. "But all this aroſe from his own original idea of ren- "dering theſe honeſt people, to a certain degree, inde- "pendent, and, conſequently, induſtrious and happy, "highly uſeful to themſelves, to the public, and to "his own property."

But it is only in ſome few ſituations, that moſs can be thus removed, and therefore other modes of culture muſt be reſorted to. When moſs cannot be cleared off, the ſubſoil muſt be abandoned, and the views of the cultivator directed to the improvement of the moſs ſoil itſelf, the ſubject now to be treated.

A judicious cultivator of any ſoil, before he begins to labour, or even fixes his plans of operation, will carefully examine the nature and qualities of the ſoil he is to improve, with all its properties and defects, ſo that he may proceed in his operations with judgment. Not only do different ſoils require different modes of treatment, but every diverſity in the ſtate of any ſoil, climate, or other circumſtances, will require a different plan of operation. What would improve or enrich one ſoil, would not only be loſt upon another, but, even upon the ſame field, when in a different ſtate. This is more eminently the caſe with moſs, than with any other deſcription of ſoil. The operations which would render one moſs productive, would injure, or be loſt upon another. The manure which would enrich one field of peat-earth, would be thrown away upon other fields of that earth; and the crop which would be profitable on one field, would miſgive on others, or even on the ſame field in a different ſtate. Much therefore of the ſucceſs of moſs culture muſt depend upon a judicious ſyſtem of operations, well adapted to particular circumſtances.

Unfortunately the cultivation and cropping of moſs, has generally been left to thoſe who were leaſt qualified to inveſtigate the cauſes of fecundity or ſterility. Their only rule of action has generally been what they have ſeen done by others no better informed than themſelves. If one man reaps a luxuriant crop, after having burnt his moſs, then nothing is thought of among his neighbours, but how to kindle the fire. If lime or dung have failed in producing a crop to the extent that was expected, the powers of theſe manures are doubled, and they are rejected.

While, perhaps, the rich crop in the one caſe, and the failure in the other, may have proceeded from cauſes very remote from thoſe to which they are imputed.

Inſtead of following uniformly that courſe of procedure, that, to a ſuperficial obſerver, may appear to have had a partial ſucceſs in ſome inſtances, without aſcertaining whether the ſoil, ſituation, and other circumſtances are every way ſimilar; a judicious improver of moſs, will carefully examine into the nature, ſubſtances, and qualities of the moſs he is to cultivate, its depth; ſituation; altitude; humidity; accidental mixture with other earths; nature and qualities of the ſubſoil; proximity to markets; and other local circumſtances; and he will vary his modes of culture, as the circumſtances of the caſe may require.

Moſſes differ ſo much in their qualities, as well as local circumſtances, that no general plan of cultivating and cropping them, will be found to anſwer equally well in every inſtance. Neither will it be poſſible in a work ſo limited, to treat at large of all the operations that may be neceſſary in every diverſity of ſoil and circumſtances. Some of the moſt remarkable only of thoſe to be found in the weſtern parts of Scotland will be noticed.

Bent and *flow-moſs* are the only diſtinctions in the quality of the moſſes known in theſe parts of the country. In ſo far as relates to the culture and cropping, no other diſtinctions ſeem neceſſary. I ſhall therefore make no other.

Bent-moſs, in the language of the weſtern diſtricts, is that firm ſolid moſs, or moſſy ſoil, which has been formed from a ſucceſſion of crops of ling, bent-graſſes, and other coarſe aquatic herbage, with a ſward of which it is ſtill found to be covered. This deſcription of moſs has generally a conſiderable declivity, is of no great depth, and always ſo firm and ſolid, as to ſupport the feet of cattle to paſture or to labour it. This kind of moſs is by far the moſt valuable for cropping. And as immenſe tracts of it remain in a ſtate of nature, in all the ſouthern and weſtern counties, the cultivation of it merits particular attention.

The mode of labouring and cultivating moſs of this deſcription, is plain and eaſy. Being once relieved from ſtagnant water on the ſurface, a good dreſſing of lime ought to be applied, and allowed to remain at leaſt a year on the ſward. Lime ſo applied, will deſtroy the coarſe bulky herbage with which that deſcription of moſs is always covered, and convert it into manure for the ſoil. Where garden mould, or other rich earth, or compoſt can be procured, they may be laid upon the ſward with the lime. They will alſo have a powerful effect in rotting the coarſe herbage, and enriching the ſoil. The effects of theſe manures being in a great meaſure confined to the ſurface, it would be proper to apply a dreſſing of cauſtic lime to the moſs, whenever it is ploughed up, and before the ſeed is ſown. A dreſſing of powdery lime, thus applied to the new laboured moſs, would help to pulveriſe the ſoil, promote the putrefaction of the moſs-earth, and thereby reduce its vegetable ſubſtance to the flood of plants.

When this kind of ſoil is cultivated, the utmoſt care ſhould be taken, not only to relieve the ſurface of all moiſture in a ſtate of fluidity, before the lime is applied, (as manure can be of no uſe where water is allowed to ſtand;) but the ground when ploughed, ſhould be carefully formed into ridges, as regular as poſſible, that all parts of the ſurface may remain equally humid. Inattention to the exact formation of the ridges and furrows, will render the whole operations abortive. Frequently ſome ſpade-work becomes neceſſary in forming the ridges on new ground. If the ſurface of moſs abounds with dry hillocks, they ſhould be dug up and removed. If they are not needed to fill up ſome low places in the field, they ought to be burnt; as the moſs-earth in theſe heights has become too dry, and oxygenated, to be formed into a productive ſoil. And when too much forced earth is thrown into a hollow, the ſoil will not retain the moiſture neceſſary to ſupport vegetation: the water will percolate through the forced earth, and the crop will be ſtarved for want of ſap.

Mr. Lieper of Drumbuie, who has excelled all others in Avendale in reclaiming moſs, begins his operations by laying off the ridges at the breadth, and in the line of direction proper to form them. He cuts out the whole furrows with a plough or ſpade, ſo as to relieve the ſurface from ſtagnant water. He fills up ſome of the low places with what has been dug from the furrows and the hillocks on the ſurface, and he conſumes the overplus with fire. The ridges being thus formed, and the ſurface laid dry, a good dreſſing of lime is applied, and the land is ploughed in about a year after. To this mode of procedure I can offer no amendments, except to recommend the application of a dreſſing of hot lime whenever the land is ploughed.

Unleſs moſs of this deſcription happens to be mixed with clay or earth, it will, when firſt dug up, be ſo tough and adheſive, as not to be eaſily formed into a vegetable mould. It will in fact be a real peat, incapable of ſupporting vegetation, until it ſhall be pulveriſed into a ſoil. This may be effected by mechanical labour, the application of manure, and the viciſſitudes of the weather.

The ſpade, the hoe, the harrow, &c. may be uſed to break and divide it. Hot lime, and other manures, will aſſiſt in pulveriſing it. And every viciſſitude of the weather will have the ſame effect. That theſe may have fuller ſcope, the moſs ought to be laboured, for the firſt time, a year, if poſſible, before it is cropped. The drought of ſummer, followed by the rains of autumn, theſe by the froſts and thaws of winter, and thoſe by the drought of ſeedtime, will, each in their turn, when aided by the force of manure, and mechanical labour, contribute to the reduction of the tenacity of the peat, and pulveriſe it into a productive mould. If the labouring for the firſt crop is not executed till the ordinary ſeaſon for ploughing, the expectation of the cultivator cannot be realized for that ſeaſon. The firſt crop is generally loſt from inattention to that circumſtance.

A letter from the pen of Sir John Sinclair of Ulbſter, M. P. lately appeared in the newſpapers, containing an account of the honourable Baronet's progreſs in the cultivation of moſs. Sir John is ſenſible of the neceſſity of the peat-earth being formed into a ſoil before it is cropped; but he ſeems to think, that that great change may be effected by froſt alone, in the courſe of a ſingle winter. With all deference to ſuch reſpectable authority, I beg leave to differ in opinion from him in this particular. I know from experience and obſervation, in inſtances beyond number, that where the moſs was not laboured for the firſt year, long before the ordinary ſeaſon of ploughing, the crop totally miſgave, merely becauſe no ſoil had been formed in which the grain could grow. It is impoſſible it can be otherwiſe. The adheſive qualities of the peat-earth are ſuch, that, until it is reduced, every furrow is, during the drought of ſummer, dried into a peat fit for fuel. Theſe adheſive qualities are too ſtrong to be reduced by the froſts of one winter. Neither can I perceive the propriety of truſting that change entirely to the operations of froſt. If that alone could form peat-earth into vegetable mould, every moſs would be already covered with ſuch a ſoil; for the froſt penetrates into every moſs in Scotland, to more than the depth of an ordinary ſoil, once or twice every winter. Froſt will, no doubt, aid in the reduction of the tenacious peat; but why truſt to it alone, or reject the influence of the rain, drought, ſun, winds, &c. Every viciſſitude of the weather will contribute to the formation and fructifying of the ſoil. The alternate rain and droughts, froſts and thaws, ſun and wind, all act powerfully in breaking down the tenacious moſs, pulveriſing it into a productive ſoil, and rendering it capable of ſupporting grain.

In that letter, the worthy Baronet ſtates, on the authority of Dr. Anderſon, that froſt converts moſs not only into a fertile ſoil, but even into manure, fertilizing it at the ſame time; but that expoſing it to the ſun, or ploughing it during the ſummer, does miſchief. With all deference, however, to the honourable Baronet, and the learned doctor, I cannot aſſent to their opinion. That the froſts and thaws will contribute to the reduction of the tenacity of the peat, and help to pulveriſe it into a vegetable ſoil, I readily admit: but ſo will alſo the rains and droughts, the ſun, the winds, and every other viciſſitude of the weather; and the oftener all theſe ſucceed each other, the ſooner, and the more completely will the adheſive texture of the peat-earth be overcome. I never underſtood that froſt fertilizes the earth, or that the influence of the ſun has a contrary effect. If the ſun and ſummer drought ſhould dry up the moiſture of the moſs, that is one of the things which Dr. Anderſon ſeems to conſider as neceſſary; for in his treatiſe on moſs, he recommends under-draining and trenching the whole ſoil, in order to carry off the moiſture. Every man duly experienced in moſs-culture, will atteſt, that no degree of dryneſs which a laboured field of peat-earth can acquire, during the drought of ſummer, will in the leaſt hinder it from being afterwards pulveriſed into a vegetable mould; but, on the contrary, will greatly accelerate the formation of the ſoil. The drought will contract the volume of the peat-furrow, or ſpadefull; the rains will again ſwell it out; the froſts will diſtend it, (or the water it has abſorbed) ſtill farther; the thaws will bring it back; the drought will reduce it ſtill more; till by theſe alternate viciſſitudes, the texture of the peat is annihilated, and it is pulveriſed into a vegetable ſoil. Even peats cut in the month of May, and carefully ſpread out to dry, if they are not uplifted, but ſuffered to lie expoſed to every viciſſitude of the weather, will, in the courſe of a year or ſo, loſe their tenacity and inflammability, and be completely melted into vegetable mould. But the drought can never have ſuch powerful effects on a laboured field of moſs, as it muſt have upon a ſingle peat four inches ſquare, and intentionally laid out to dry.

Whatever fertilizing effects, therefore, the froſt may have on the moſſes at Strathnaver, or the farm called Auſdale, where Dr. Anderſon made his experiments on the cultivation of moſs, the ſun and the rains are the great fertilizers of every deſcription of ſoil on the ſouth ſide of the Forth; and they have alſo the moſt powerful effects, as well as the froſt, in changing the mechanical arrangement of the peat ſoil, and converting it into vegetable mould. The drought of ſummer, while it contributes to that end, does no miſchief whatever to the moſs-earth, in this part of Scotland. On the contrary, various conſiderations occur, to render the ploughing of moſs in ſummer adviſeable. If the moſs is deep and ſoft, it will ſupport the feet of horſes much better during the drought of ſummer, than when it is drenched in the winter rains. It can be ploughed at leſs expence in ſummer, when the horſes are fed upon graſs, than in winter when they muſt be fed on corn and hay, and when it would, beſides, interfere with the other labour of the farm.

Sir John Sinclair recommends ploughing of the turf or ſurface, with a fen plough, and either burning it, or laying it up into dykes, to ſhelter the land; and and after it has been removed, he propoſes ploughing a ſecond furrow, in the month of September, or after that period, to be reduced to a mould by the froſt, during winter, and cropped in the ſpring. But the advantage of that operation does not ſeem obvious. I cannot diſcover why the moſs ſoil may not be formed from the upper ſtrata, as well as from the moſs below. The bulky herbage on the ſurface will certainly go faſter into putrefaction, and yield more vegetable food to the ſoil, than the cold torpid body of peat-earth below can be expected to yield. The upper ſtrata having been operated upon by the weather, is always partly formed into a ſoil, and will certainly go faſter into a pulveriſed mould, than the more tough tenacious peat below. The upper ſtrata is laid aſide when the moſs is dug for fuel, merely becauſe it has become too brittle, and partakes too much of the nature of a vegetable mould to be turned into peat. For the ſame reaſon it ought to be preferred when a vegetable mould is the object in view. It will do better than the more tenacious peat below, and the expence of ploughing and removing it may be ſaved.

Never having ſeen the moſſes in Caithneſs, I can ſay nothing about their ſolidity; but ſure I am, that none of the moſſes on this ſide of the Forth, will, after being diveſted of their turfy ſward, ſupport the feet of cattle, to plough a ſecond furrow, during the winter months.

Such moſs being always covered with a ſward of bulky herbage, the firſt crop ought to be potatoes, wherever a ſufficient quantity of dung can be procured. The mode of planting the potatoes, and culture for the ſucceeding crops, will be noticed under the article cropping.

As moſs of this deſcription abounds in all the counties of Scotland, the reclaiming of it becomes a matter of great importance. Many hundred acres of benty-moſs land in Avendale, and its neighbourhood, at preſent ſcarce worth a ſhilling per acre of yearly rent, might eaſily be rendered as productive as the beſt land in that diſtrict. If the labouring, manuring, and cropping be conducted with any degree of propriety, the two firſt crops will indemnify all expences; and as ſeveral crops of oats may be taken before it is laid into graſs, without injuring the ſoil; and as the paſture of the moſs, would, for many years after, be ten times more valuable than that which it now produces, the cultivation of moſs, eſpecially bent-moſs, is ſurely a matter deſerving of attention. The inattention of the proprietors of moſs-land, and their tenants, to this ſource of wealth, and of national improvement, ſeems altogether unaccountable. Within the diſtrict of Avendale, to which my attention has been more particularly directed, Mr. Young of Greenfield, Mr. Lieper of Drumbuie, and Mr. Hamilton of Stabbieſide, have all of them enriched themſelves, and greatly increaſed the value of their eſtates, by the cultivation of benty-moſs. They have ſet their neighbours a pattern worthy of imitation, and ſeveral others have begun to follow their example. But the practice is ſtill far from being ſo general as could be wiſhed for. The high prices obtained for cattle, and their produce, for ſometime paſt, has been unfavourable to the cultivation of moſs-land. When the poſſeſſors of land place their chief dependence on the rearing of cattle, and the dairy; the habits of induſtry gradually wear out, and the indolence of the paſtoral life prevails. It is eaſier to carry the ſhepherd's crook, than to guide the plough.

In the higher part of the eſtates of his Grace the Duke of Hamilton, vaſt tracts of benty-land, excellently adapted to cultivation, remain altogether neglected. The tenants, who are neither bound in their leaſes, nor have any example ſet them, nor encouragement given to improve their moſſes, never think of reclaiming them, while they are able to raiſe their rents by modes of huſbandry which are leſs laborious. They are much diſcouraged in this, and all their agricultural improvements, by his Grace's coal and lime-works in that end of the diſtrict, (which are inexhauſtible,) being ſhut up from them and the public. The ſmall proprietors generally pay little attention to the reclaiming of moſs on their lands. The old proprietor is generally too much wedded to the modes of farming to which he had been accuſtomed, to purſue any improvement that bears the name of novelty. The great ambition of moſt of them, is to ſcrape together as much ready caſh as poſſible, as if that yielded them more profit than a well cultivated eſtate. Few of them give due encouragement to their tenants to reclaim their moſſes. The young lairds again are often too proud, and too indolent to enter on ſuch improvements. Many of them prefer dealing in cattle, or the barbarous and trifling practice of hunting, to the cultivation of the ſoil. It ſeems to be more agreeable to them, to range the muirs for game, or traverſe the country to traffic in cattle, than to rive bent. The dog and the gun, are unfortunately ſtill conſidered as appendages of a gentleman; the plough is regarded as the drudgery of tenants and ſervants. A dead hare, or brace of muir-fowl, yield a ſpeedy and certain return; that obtained from the cultivation of moſs, is more diſtant and doubtful.

Flow, or flaw-moſs, though of leſs value, and not ſo eaſily improved as bent-moſs, is nevertheleſs capable of being cultivated and cropped to conſiderable advantage. Being deep, and too ſoft to bear the feet of cattle, it muſt be laboured with a ſpade, until it becomes more ſolid. In this as in all other kinds of moſs, the ridges and furrows muſt be ſo regularly formed, as not to leave a crop of ſtagnant water on any part of the ſurface. If that is not attended to, the end in view will not be attained. The formation of the ridges and furrows, ſo as to relieve the ſurface at all times of water in a fluid ſtate, and yet not to render any part of the ſoil too dry, is one of the moſt important things to be attended to by the cultivator of a moſs ſoil; and as this circumſtance is ſeldom duly regarded by the beginners of moſs labour, I hope I will be forgiven for ſo often repeating the caution. If the ſurface of the moſs be uneven, the hags deep, and the hillocks much dried, it will be neceſſary to remove the dry moſs, or to burn down the heights. For if much of it is thrown into the gullies, the water will ſo eaſily percolate through it, that the ſurface will become too much diveſted of moiſture.

The additional expence of delving, will render the profits ſmaller, than when the moſs can be laboured with cattle. From £2 : 5, to £2 : 10, is now generally paid for delving the firſt time, and from 30s. to 40s. for after crops. This increaſed expence is not altogether loſt. The ridges and furrows are much better formed by that mode of labour, than they can be by the plough. The ſpade labour, too, is much better calculated to break and divide the moſs-earth, and thereby accelerate the formation of a ſoil, than can poſſibly be done by the plough. If the moſs ſhould be ploughed for the firſt ſeaſon, I would recommend delving for the ſecond year, in order to break the furrows, and the better to form the ſoil, Ploughing the ſecond year becomes extremely difficult on account of the toughneſs of the old furrows, and unevenneſs of the ſurface.

The cultivator, however, will ſoon be relieved from the additional expence of delving the moſs. The gentleman who deſcribes the moſs-culture at Swineridgemuir, informs us, that the moſſes there were "ſo wet and ſpungy in their natural ſtate, as not to "be capable of bearing a dog;" yet they have been reclaimed, and become ſo ſolid, as to bear the operation of ploughing, The fact is not to be doubted, but he is ſurely in an error when he aſſerts (page 11th,) that moſs will always bear cattle after the third crop. The flow-moſs ſituated on the weſt ſide of Strathaven church, to be afterwards deſcribed, was capable of ſupporting not only the foot of a dog, but that of a man, before it was begun to be cultivated; yet, with cultivation, as well conducted as any in Scotland, it requires never leſs than ten or twelve years labouring and cropping, to render it fit to ſupport the feet of plough horſes. When a greater quantity of lime is applied, the conſolidation of the moſs will proceed faſter, but none of the ſoft flow-moſſes in this part of the country, can, under any culture, be rendered ſo ſolid as to admit the plough drawn by cattle merely on being delved three ſeaſons.

Flow-moſs, like that of bent, requires to be laboured for the firſt time, at leaſt ten or twelve months before it is cropped, and as early as poſſible for after crops. Dr. Anderſon reprobates early ploughing of moſs, but I cannot ſubſcribe to his opinion. The earlier moſs is laboured, and the more it is ſoftened by the rains, and pulveriſed by the froſts, the better will it cover the ſeed: the leſs will it be diſpoſed to heave, and the more certain will be the crop.

Till moſs acquires ſolidity to ſupport the feet of cattle, the harrow muſt be drawn by men. A ſmall wooden harrow with iron teeth, not too weighty for two men to move, is the beſt inſtrument for covering the ſeed.

Rolling is the only other operation I ſhall notice under this article. This is an operation of huſbandry but too often neglected. In a moſs ſoil, it is of the higheſt importance. The neglect of it will frequently prove fatal to the crop.

The greateſt defect of moſs as a ſoil, is, that it is too light and open. The drought too eaſily penetrates deep into the moſs earth, and in a very ſhort time diveſts it of moiſture to a greater depth, than the roots of grain can reach. This defect in a peat-ſoil is not eaſily remedied. The beſt method of doing ſo, is to cover, or mix the moſs-earth with clay, ſand, or ſome heavier ſubſtance. Lime, too, has a powerful effect in conſolidating a moſs ſoil; and the only other antidote that occurs, is frequent rolling. The moſs ſhould if poſſible be ſown before it becomes too dry, and when it is harrowed, it ought to be inſtantly rolled. Rolling the moſs while the moiſture remains in it, will have the moſt powerful effects in conſolidating the ſoil, as well as making it retain ſap. Beſides, if any part of the ſeed ſhould have been left uncovered, the roller would remedy that evil. If the roller were inſtantly to follow the harrow, the one half of the harrowing might be ſpared, and both operations executed at no additional expence. Rolling before the ſap is exhaled by the drought, would retard evaporation, and tend greatly to preſerve due moiſture in the ſoil: but it is in vain to roll, after the ſap is gone. In order ſtill more to conſolidate the ſoil, it might be proper to roll a ſecond time after the corn had appeared above ground; the weight of the roller would not only conſolidate the moſs-earth, but alſo ſqueeze up moiſture from the damp moſs below. It is likewiſe neceſſary to roll moſs when it is in paſture, as it tends to baniſh the ſorrel and other uſeleſs herbage, and to introduce clover and richer graſſes. Dr. Anderſon makes many judicious remarks on the propriety of rolling moſs, which I am ſorry my limits do not permit me to quote.

Neglecting to roll, is the greateſt error which I can point out in the Strathaven mode of moſs-culture, and it ſeems to proceed chiefly from the want of a proper conſtructed roller, to be drawn by men. Such rollers are unknown in Avendale, and thoſe moved by horſes, cannot be brought upon the moſſes, which are too ſoft to bear the foot of that animal. The few rollers uſed in Avendale, are formed either of ſtone or of wood, frequently not more than a foot or 18 inches in diameter. Rollers of that conſtruction may be drawn, or rather made to ſlide over the land; but they can never turn upon rough ground with that eaſe which a roller ought to move. By ſliding and preſſing forward the earth, they frequently injure the crop, and break its roots.

A roller for moſs ſhould be formed of *caſt iron*, hollow in the centre, and about four feet diameter. A roller of that dimenſion, and about four or five feet long, could, if properly framed, be drawn by men at leſs expence, than thoſe uſed in Avendale, can be drawn with horſes; while the damage done by the horſes feet would alſo be prevented. The feet of horſes do much injury on any ſoil, when rolling after the crop has appeared above ground; but on moſs, even when it has acquired the greateſt ſolidity it is capable of, they muſt do ſtill greater miſchief.

To remedy the evil, Dr. Anderſon propoſes a portable foot-path of wood for the horſe to travel upon, when drawing the plough or roller. This ſeems to me rather an extravagant project. I ſhould think a horſe might as well be taught rope-dancing, as to draw a plough or roller, travelling on the looſe boards of an old ſhip. When a horſe ſets his foot on the one end of the plank, his weight would ſink it into the ſoft moſs, and the other end would ſtart up in his face. His feet would ſlide on the wet boards, and every falſe ſtep would ſink him in the moſs.

But ſuppoſing that a horſe could be taught to perform this extraordinary exerciſe without any accident happening, ſtill the coſt of it would far exceed that of delving, or turning the roller with men. The expence of a horſe, plough, boards for a foot-path, driver, ploughman, and three or four men to remove the boards every furrow, would far exceed that of delving the moſs with a ſpade. A roller properly conſtructed, might be moved by two men, and the additional expence of a horſe, driver, boards, and board-ſhifters, might be ſpared. The ingenuity of projectors ſometimes degenerates into whim. It is rather unfortunate, that a gentleman of learning and abilities, ſhould propoſe ſuch a fanciful project, in a matter ſo ill underſtood as that of moſs-culture. Such an extravagant ſcheme, which every one converſant in practical huſbandry muſt ſee to be impracticable, tends to diſguſt the farmers, and confirm them in their prejudices againſt moſs-culture. The progreſs of agriculture has often been retarded, and the prejudices of the ignorant confirmed, by the freaks of wild projectors. Gentlemen who entered on improvements on liberal plans, and from the moſt patriotic motives, have often been deceived, and much injured, by attempting to reduce into practice ſuch extravagant theories. Being ſtrangers to practical huſbandry, they liſten to plauſible ſpeculations, and attempt to carry them into effect. But after throwing away large ſums, they come to be baffled in their deſigns. Their ſanguine expectations are not realized, they abandon their improvements with ſhagreen and diſguſt, and the failure of their extravagant ſchemes, ſerve to confirm their ignorant neighbours in their prejudices againſt all improvements whatever.

Some have tried to ſupport the feet of horſes on moſs, by means of boots or boards fixed on the horſe's hoofs. When theſe can be ſo framed as to adhere to the foot, without injuring it, and the horſe taught to walk with them; they are certainly much more practicable than a foot-path of looſe boards: but the moſs muſt have acquired conſiderable ſolidity before the boots can be truſted to.

It was my intention to have given a detailed account of the improvements in moſs, going on in many places in the ſouthern and weſtern ſhires of Scotland; having ſurveyed many of them for that end. But I find it would too much ſwell my pamphlet, without being of any material advantage. I cannot, however, omit deſcribing one which has attracted my notice for near 30 years paſt, and which I have lived within half a mile of, for the laſt 20 years.

Strathaven moſs, was, according to the beſt information I have been able to procure, the firſt moſs in Scotland, or at any rate in the weſtern counties of it, from which grain was raiſed. The mode of cultivation by which it has been reclaimed, was not borrowed from Ireland, but diſcovered, and reduced to practice, by the proprietors and tenants, who have reaped much wealth from it, in reward of their induſtry. The quantity of corn which that moſs has yielded has been immenſe, and the melioration of the soil has far exceeded any thing to be ſeen in the weſt of Scotland.

This flow-moſs is ſituated within a quarter of a mile of Strathaven church, and extends to near 200 acres. It is ſurrounded by higher lands, belonging to 10 or 12 different proprietors; to each of whom ſome part of the moſs alſo pertains. On the verges of the moſs, and between it and the ploughable land, lay ſome miſk or bent-land, covered with coarſe benty herbage, but the centre of the flow was moſs of the wetteſt and leaſt valuable kind. As a great number of ſprings aroſe on all ſides of this flaw, and a conſiderable ſtream of water ran through, or rather over the moſs, the lower parts of it were almoſt a loch, until a caſt was opened about 60 years ago, to carry off the water. That this flow had formerly been a wood, is evident from the vaſt quantity of timber ſtill found under the moſs. In this as in many others of our deep moſſes, large trees are found on the ſubſoil under the moſs, and great numbers of ſmall trees, moſtly birch, are found ſeveral feet higher in the moſs. Their roots being found adhering and extended in the natural poſition, proves that theſe trees have grown ſpontaneouſly after the moſs had riſen over former generations of trees. This alſo proves, that birch and other aquatic trees will grow in moſs ſoil, if they are only planted and protected.

This flow is of various depths, from one to 20 feet. From its land-locked ſituation, and the water that ran upon it, no flow could be ſofter or of leſs value. Till about the middle of laſt century, one hundred acres of it was rented at half-a-crown, and a long leaſe of it might then have been got at a halfpenny per acre.

About the year 1750, the late Mr. Hamilton of Collinhill, proprietor of a large tract of the moſs, began to cultivate ſome part of it. He firſt ploughed ſome of the bent on the verge of the flow, and finding that it yielded a tolerable return, he proceeded to delve and crop part of the flow itſelf. He applied a little dung to what he laboured, (no other manure being then uſed in that neighbourhood,) and the crops it yielded were very abundant. Mr. George Cochran, ſurgeon, perceiving Mr. Hamilton's ſucceſs, began a few years after, to labour part of the flow, on a more extenſive plan. Their ſucceſs rouſed others to induſtry. Moſt of the neighbouring proprietors began with labouring a few falls at firſt, and extending their operations from year to year, till the whole flow, (ſave a few roods of the drieſt and leaſt valuable, on which a ſervitude for peats is held,) has, many years ago, been improved and rendered highly productive. As far back as the year 1760, and 1764, leaſes were taken, and purchaſes made of part of the flow, for the purpoſes of labouring and cropping it. A large tract of it, which belongs to Mr. Brown of Newton, has long been under leaſes, in ſmall lots, to tenants, who, when induſtrious, have drawn conſiderable profits from their bargains. I have not been able to diſcover the rent paid by ſome who firſt began to break up the moſs; but for 30 years paſt, the rent to the firſt cultivator has been 10 ſhillings each acre per annum, for a leaſe of 12 or 15 years, but the firſt year rent free. A turnpike road which happened to be formed through this moſs in the year 1772, and another in 1790, greatly facilitated its improvement.

Though this flow was as ſoft and wet as any flow ever was or could be, no draining has ever been executed upon it, ſave a deep ditch opened to carry through the burn that overflowed it, and ſuch inlets or furrows as were neceſſary to relieve the ſurface of the flow from ſtagnant water. No draining nor under-draining was ever attempted upon this moſs, beyond what would have been done, had the ſoil been compoſed with ſolid clay, loam or ſand, inſtead of moſs. Even where ſprings riſe up from the ſubſoil, or on the verges of the flow, all that has been done was to open a ſmall channel to the water, ſeldom deeper than the ordinary furrows. The ridges are formed from 6 to

12 yards broad, and never raiſed more than a few inches on the crown. The furrows are about a foot wide, and from 6 inches to a foot deep. No part of this flow, though it is nearly level, has ever ſuffered for want of draining. On the contrary, thoſe parts of it which have been leaſt drained, have always been the moſt productive. Wherever the ridges have been raiſed higher than their uſual, or upon the ſides of the roads or burns where the drains are deep, the crop has ſometimes ſuffered for the want of moiſture. But no part of it has ever been hurt by an over quantity of moiſture, except where water has been allowed to ſtagnate. One of the proprietors (Robert Miekle,) had raiſed the ridges of his moſs ſome higher than uſual, and it was found greatly to injure it: but his heirs perceiving the error, are now forming it into broad lands without furrows.

This moſs has always been laboured with a ſpade, for the firſt 12 or 15 years, but much of that which was firſt laboured, now bears to be ploughed with horſes. The longer it is cultivated, it becomes the more ſolid, and gradually ſinks lower on the ſurface. Some parts of this moſs have ſunk perceptibly in the courſe of a few years, and will ſoon be annihilated to the clay, If a road is formed through a flow, and the moſs allowed to remain uncultivated, from the weight of the road, and growth of the moſs on the ſides of it, the road will ſoon appear as if ſunk in the moſs. But if the flow is brought under cultivation, moſs will ſink ſo faſt, that, in a few years, the road will appear as if it had been raiſed high by forced earth. The flow at Strathaven, and that at Flat, in the neighbouring pariſh of Glaſsford, prove theſe facts to a demonſtration. The road formed through Strathaven flow, in 1772, is now near three feet higher than the cultivated moſs on the ſides of it. It begins to have the appearance of a mound of earth raiſed through a valley. The other road, made in 1790, has not yet riſen ſo far above the moſs on the ſides of it, as the other, but it is evidently a foot or two higher already, and is faſt riſing. This cannot proceed from any growth or accumulation of moſs on theſe well frequented roads. On the contrary, both of them muſt now be conſiderably lower than when they were firſt formed. The weight of the road-metal, and preſſure of carriages, muſt have ſunk and conſolidated the moſs-earth conſiderably, and the deep drains on both ſides theſe roads, muſt have given vent to the water which diſtended the moſs-earth: yet ſuch is the effects of cultivation, in conſolidating moſs, and lowering its ſurface, as to ſink it much farther. The drains and ſewers were cut in both theſe roads ſeveral feet below the ſurface; but the moſs has ſunk ſo much by culture, that thoſe in the road made in 1772, do not now ſufficiently relieve the ſurface of the moſs from water, and muſt inſtantly be ſunk deeper. It is not merely the ſide drains which I here refer to, but the ſewers which run acroſs the road, and are no way filled or grown up. On the contrary, the road through the moſs at Flat, which has not been cultivated, has now the appearance of a groove or canal cut in the moſs. As the drains on the ſides of this road are not one-third part of the depth of thoſe on the ſides of the other moſs that have been deſcribed, that road cannot have ſunk ſo much as the roads through the Strathaven flow, yet ſuch is the growth of the moſs in the one caſe, and the ſinking of it in the other, that while the one road has riſen like a mound, the other has the appearance of being ſunk like a groove. [*]

The only manure ever applied to Strathaven moſs was dung, generally at the rate of five or ſix tons per acre, every ſecond or third year, thrown on with the ſeed. Two-thirds of this moſs has always been cropped with oats, and after the firſt or ſecond crops, when the ſoil was not duly formed, generally from eight to twelve bolls of excellent oats, have been reaped from each acre; and, in many inſtances, more than ſixteen bolls of corn, of the beſt quality, has been taken from one acre of this moſs [†]. The grain it yields is better in quality, and more productive of flour, than that growing on the adjacent dry lands. Potatoes, flax, barley, ſome wheat, and ſome peaſe, have been raiſed from this flow, and the crops excellent; but oats have been the moſt common crop.

This flow, with the modes of labouring and cropping that have been deſcribed, has, for many years paſt, yielded more grain, than twenty times what has been prod[illegible]d, on the average of the arable land in the ſhire of Lanark; and its rent has been doubled a thouſand times! The whole flow will now rent at from two to three pounds ſterling per acre.

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[*] Part of the moſs lands of Collinhill, that were begun to be cultivated about 40 years ago, ma[illegible]es with ſome of thoſe of Mr. Brown's, that were not begun to be laboured till about 1790. At that time Collinhill moſs had ſunk three or four feet below the other. Since Mr. Brown's moſs came under cultivation, it has ſunk conſiderably, but it is ſtill two feet higher than that of Collinhill, originally, in every reſpect, equal to, and level with it.

[†] The crops of oats cut from ſome parts of this flow, in the harveſts 1799, and 1800, brought, at the common prices of theſe years, upwards of *thirty pounds* ſterling per acre!

The induſtry which has effected ſuch a change, merits the higheſt praiſe. Dr. Swift remarks, that a man who makes two ears of corn to grow, where only one grew formerly, is of more ſervice to mankind, than the whole race of politicians together. What praiſe muſt there be due to them who have raiſed many thouſands of bolls of grain from a moraſs, which had never yielded one ear of corn, till reclaimed by their induſtry? They have done more good to mankind, than if they had founded a church, or formed a new ſect of worſhippers. It would, perhaps, be difficult for ſome of thoſe holding very extenſive property in that neighbourhood, to point out as much improvement made by their families for a century paſt, as has, in this inſtance, been achieved, by the induſtry of a few poor people, in the obſcure town of Strathaven. Several hundreds of bolls of corn are now raiſed every year, from a barren waſte, which many perſons yet alive has known rented at 2s. 6d. per annum. Their example is worthy of imitation, and, I truſt, will rouſe others to ſimilar acts of induſtry. If patriotiſm and philanthropy actuate the mind, what can be ſo gratifying as to convert the deſert into a fruitful field? If wealth is ſought after, where is it poſſible to reap a greater profit, than in raiſing a rent-roll from half-a-crown, to four hundred pounds per annum, in one lifetime.

It is true, that the value of land has greatly increaſed within that period, even where no improvements have been made. But the rent of a deep flow or lake, has not been, nor cannot be advanced, unleſs improvements are made. Had the rental been doubled ten times, ſtill it would have amounted to no more than a few ſhillings, but their induſtry has raiſed it from 2s. 6d. to £400.

Every moſs in Avendale, and moſt of thoſe all over Scotland, if not lying in too great altitude, are as capable, and many of them more capable of cultivation, than the moſs which I have deſcribed. It has been manured with dung, which its proximity to Strathaven afforded in greater abundance than can be obtained in every ſituation: but dung is not the only, nor indeed the beſt manure for moſs. Lime, marl, clay, ſand, &c. are all powerful manures to moſs, and all of them may be found in the Avendale muirs in great abundance, and may alſo be procured, for many other moſſes, at no great diſtance. And, whenever the Strathaven ſpirit of induſtry for moſs culture ſhall extend to theſe regions, the moſſes there will be rendered as productive as the Strathaven flow.

Manuring of Moſs Soil.

MOSS-EARTH, like every other deſcription of ſoil, is capable of being meliorated by the application of manure. And as almoſt every ſubſtance whatever will operate as manure to a peat-earth, it is in that reſpect more eaſy to improve moſs, than any other ſpecies of ſoil.

It will always be the firſt care of a prudent cultivator, to examine with attention the ſoil he intends to improve; aſcertain of what it is compoſed; what are its qualities; what its defects; and how they can be remedied. The greateſt defects of a moſs ſoil, are its ſoftneſs, and the inſoluble qualities of the peat-earth. Moſs-earth is light, open, ſoft, and ſpungy, and ſo very ſuſceptible of water, that, in the rainy ſeaſons, it becomes quite overcharged with moiſture; yet ſo eaſily parts with it, that, in time of drought, the crop is in danger of periſhing for want of ſap. It is ſo eaſily wetted, and ſo eaſily dried, that vegetation is endangered by every viciſſitude of the weather. Only render a moſs ſoil ſolid, more retentive of moiſture, and bring the vegetable ſubſtances of which it is compoſed into a progreſſive courſe of putrefaction, and you will thereby render it the moſt valuable and the moſt productive of all ſoils.

Theſe ends, however, are only to be attained by perſevering induſtry. Clay, ſand, earth, rotten-rock, with every ſolid, weighty, and adheſive ſubſtance whatever, which is capable of being reduced to a powdery ſtate by the weather, will form a rich and powerful manure to a peat ſoil. No matter how meagre the ſubſtance be, provided only it be weighty, and capable of being reduced into earth, it will change the mechanical arrangement of the peat-earth, and give it that ſolidity which it ſo much wants. Such ſubſtances will render the moſs ſoil much more retentive of moiſture, and not only prevent the further growth of the moſs-plants, and totally change the herbage, but will alſo promote the putrefaction and decompoſition of the moſs-earth, and thereby render the ſoil productive.

In many ſituations, ſand or earth might eaſily be flooded on the moſs by means of ſtreams of water. Where that cannot be done, it ought to be carted on in time of drought or froſt. Where the ground is level, or has a declivity, two labourers with a horſe and cart, could tranſport twenty, or, perhaps, thirty tons of ſand in one day, which would be a ſufficient dreſſing for a rood of moſs. Such a dreſſing of ſand or earth, with a moderate quantity of hot lime, to accelerate the putrefaction of the moſs, would render the worſt of flow-moſs, which perhaps does not bring a penny per acre of yearly rent, worth 20s. or 30s. every acre in future. Every farmer occupying moſs-land, might eaſily reclaim, in that manner, a few acres of it every year, without any material expence, in the time which they and their ſervants uſually ſpend in the ſilly and trifling paſtime of curling, from which no improvement to either body or mind, nor even any rational amuſement, can be derived.

Frequently the moſs is ſo thin, that the clay or loam of the former ſoil, is ſtill within reach of the plough or ſpade. And where matters are in that ſtate, the moſs may be enriched without the expence of carting. Sometimes, too, the clay dug from under the moſs, will be found to contain a conſiderable quantity of calcareous matter. This is a treaſure of great value, and it is well known, that much of it might be found under many of the moſſes in Avendale.

Burning of moſs, to enrich the ſoil by the aſhes, has been too often practiſed. But except where the moſs has been too dry, or where it is very deep, and no other ſpecies of earth or manure can be found, burning ought never to be practiſed. The Earl of Dundonald has ſhown, that where moſs is burnt, not more than one-twentieth part of the vegetable food it contains is preſerved on the ſoil, and 19 twentieths is diſſipated in gas. The ſmall quantity of alkaline ſalt in the aſhes may ſerve to raiſe one good crop; but when that ſubſtance is waſhed out by the rains, nothing remains but the mere fixed earthy parts of the moſs, which is but ſmall in quantity, and extremely meagre. Moſs ought never to be burnt, but for the purpoſe of removing the dry oxygenated peat-earth from the tops of the hillocks, which had become incapable of ſupporting vegetation, or to form a ſoil where no other earth or manure could be found.

A ſtrong clay ſoil, either mixed or covered with a quantity of dead torpid moſs-earth, is often found on the ſides of muirs and moſſes. That deſcription of ſoil is of a black colour, and what the country people call deaf, much diſpoſed to heave on the crowns of the ridges, with nothing toward the furrows, but a cold tenacious clay, incapable of producing grain. The greateſt improvement of ſuch a ſoil, would be to dig up and dry the whole peat-earth which it contains, and, having mixed it with as large a portion of the clay as it could burn, to ſet the whole on fire. This would relieve the ſoil from that uſeleſs torpid peat-earth, which the moſt powerful manure could ſcarcely render ſoluble; and the burning it with the clay, would enrich the latter ſo much, that the ſoil would be greatly improved in its mechanical arrangement, and much more productive for many years to come. If the quantity of moſs in the ſoil ſhould be inadequate to calcine a conſiderable portion of the clay; it might be proper to add a quantity of freſh moſs for that purpoſe. I remember to have ſeen a ridge of land, compoſed of a mixture of dead inſoluble moſs, and cold unproductive clay ſet on fire by accident, in the beginning of ſummer, when extremely dry. The ridge burnt till the peat-earth was completely conſumed, and a large portion of the clay with which it was intermixed was calcined. The proprietor thought the ground was loſt, but he was happily diſappointed. The ſoil was ſo much enriched by the burning, that he found it his intereſt to dig up, dry, and burn the whole field. In burning ſoil of this deſcription, the utmoſt care ſhould be taken to conduct it in as ſmothered a way as poſſible, in order to preſerve the vegetable matter from being diſſipated in gas.

As the burning here recommended muſt diveſt the ſoil of vegetable matter, it will be proper inſtantly to replace it. If dung cannot be found, moſs mixed with hot lime, or with dung, to render it ſoluble, ſhould be applied; tares might be ſown and ploughed down, or whatever other means may be found to be beſt calculated to replace in the ſoil, a due proportion of vegetable matter, of which it had been diveſted by the burning. It may appear ſtrange at firſt view, to propoſe to burn up the moſs already in the ſoil, and to replace it with another quantity of that earth. A little reflection, however, will ſhow the propriety of the meaſure. The moſs in the ſoil propoſed to be burnt, will be found to be much more inſoluble than the common moſs: ſo much ſo, that it would exceed even the powers of cauſtic lime completely to diſſolve it. Burning not only removes the worſt of all moſs, but it alſo enriches the clay, and corrects its greateſt defect; while the new moſs recommended to be applied, having been rendered ſoluble by fermentation with dung or hot lime, will prove a rich manure to the ſoil, and replace in it the vegetable matter which had been burnt. The burnt clay, and the change which it will effect in the mechanical arrangement of the ſoil, will greatly promote the putrefaction and decompoſition of the new applied moſs. By ſuch means, the barren fields ſituated on the verges of the moſſes and muirs, might be rendered fertile at a ſmall expence.

Some have burnt the heather, ling, and coarſe herbage, upon a muir ſoil, even where there was little or no moſs-earth; but this is now juſtly exploded, as extremely bad huſbandry. And it is no leſs improper to burn the moſs-earth off a ſandy ſoil.

Every ſpecies of calcareous earth will be found to operate as a powerful manure to a moſs-ſoil, eſpecially when they are applied in a cauſtic ſtate.

Gypſum is of all others the moſt powerful of the calcareous genus of foſſils. This ſpecies of manure, which is ſometimes called Alabaſter or Stucco, is a calcareous earth, abounding with vitriolic acid, and is ſoluble in five times its weight of water in the temperature of 60. It poſſeſſes extraordinary ſeptic powers, and accelerates putrefaction more powerfully than any other ſubſtance can do. Five hundred weight of raw materials from the quarry, when reduced to powder, and ſown upon the ſurface, in January or February, will completely diſſolve the graſs and vegetable matter on the ſoil, and melt them down to the food of a new crop. It greatly promotes the growth of clover, pulſe and corn, and is certainly the moſt powerful manure for a moſs ſoil. This valuable manure was diſcovered about 36 years ago, by Mr. Mayer, a German clergyman, and it is now very much uſed over all Europe, and America. It probably does not very much abound in the weſtern parts of Scotland, neither has it been much ſought after there. But it is to be found in great abundance both in England and Ireland, and is uſually ſold at the quarry, at 2s. 6d. per hundred weight. And as five hundred weight of it is a ſufficient dreſſing for one acre, and that quantity can be obtained for 7s. 6d., it will be found to be the cheapeſt, all well as the moſt powerful of all manures. But it is unfortunately very little known, or ſought after, in this part of the country.

Quick-lime is, next to Gypſum, the moſt valuable and powerful manure known in Scotland for a peat ſoil. It ſeems to have been formed by the Creator, to remedy every defect in that ſpecies of earth. It powerfully promotes the putrefaction of the vegetable matter of which the moſs is formed; breaks its coheſion; acts powerfully on the acids in the peat-earth; and forms with them a neutral ſubſtance, which has powerful fertilizing effects; ſtrongly conſolidates the the moſs ſoil; baniſhes the heath and coarſe moſſy plants, and covers the moſs with clover and daiſies. Dr. Anderſon very properly remarks, that the effects of lime, or other calcareous matter, when applied to moſs in ſufficient quantities, appear to be little ſhort of enchantment. If lime, or other calcareous ſubſtances are laid on the ſward, though the land be neither laboured, nor any ſeed ſown, ſuch are the effects of hot lime, that the moſs graſſes will inſtantly diſappear, and a rich and beautiful ſward of clover, daiſies, and the richeſt poa-graſſes will riſe ſpontaneouſly. As the greateſt part of the muirs in the weſtern counties of Scotland abound with lime and coal, and as many of them alſo contain vaſt treaſures of marl, the reclaiming of the moſſes in theſe diſtricts will become an eaſy matter, whenever the proprietors and poſſeſſors ſhall be diſpoſed to turn their attention to that important branch of improvement. It has already been mentioned, that when lime is applied to a rough benty ſward, it ſhould be allowed to remain a year upon the ground before it is ploughed, and a dreſſing of hot lime ſhould again be laid on when the moſs is laboured. If the lime happens to be too much damped, it ſhould be brought back, and dried by a mixture of ſhell, or unſlacked lime, which would abſorb the moiſture, and render the whole powdery. To ſave the labour of carrying on the lime in barrows, where the moſs is ſoft, it might be brought from the kiln, carted upon the moſs, and laid down in cart-loads, or ſtill ſmaller quantities, and ſpread with a ſhovel after the froſt was gone. Lime in a cauſtic ſtate, will not only help to reduce the moſs to a vegetable mould, but by promoting its ſolubility and decompoſition, will convert it into vegetable food. Even when its cauſtic powers are exhauſted, and the lime is become effete, it will help to conſolidate the ſoil, and enrich it, by attracting nutriment from the atmoſphere.

Marl, *ſhell*, &c. will operate as manure to moſs, in proportion as they abound in calcareous matter. I have been much ſurpriſed to find, that although it is well known, that ſhell and clay marl abound in ſome of the muirs in Avendale; yet ſuch is the inattention of proprietors and tenants, to what might be converted into ſources of wealth, that theſe valuable treaſures ſtill remain unbroken; a proof that agriculture has made but ſmall progreſs in theſe regions.

Dung is a powerful manure to a moſs ſoil. The improvement of moſs, by manuring it with dung alone, is no where better underſtood, or practiſed with greater ſucceſs, than in Avendale. The flow moſs in the vicinity of Strathaven already deſcribed, has been enriched, and made to yield for near half a century paſt, vaſt crops of grain, with no other manure but dung, and that only in ſmall quantities. Lime and other foſſil manures of the calcareous kind, do certainly act moſt powerfully, when applied in a cauſtic ſtate, both in forming the ſoil, conſolidating it, and rendering the moſs more ſoluble, as well as to yield a certain and more ſpeedy return. Dr. Anderſon aſſerts, (page 103,) that "dung is a manure not "adapted to the nature of moſs land, until the moſs "be converted almoſt entirely into the ſtate of earth, "having loſt nearly the whole of its inflammability." Had Dr. Anderſon made proper trials of dung as a manure to moſs ſoil, or even made due inquiry at ſuch as had made the experiment, he would not have run into that error. Dung is a ſpecies of manure, well calculated to raiſe the richeſt crops of grain from every kind of peat ſoil. I can atteſt, that I have reaped at the rate of fourteen bolls of good corn per acre, from a moſs ſoil of unknown depth, without applying any other manure but dung, at the rate of ſix or ſeven tons per acre. Many thouſands of bolls of the beſt of grain, and the crops the moſt luxuriant, have been raiſed from the moſs at Strathaven above deſcribed, with no other manure but dung. Ten bolls on an acre have been conſidered no more than a middling crop on that moſs.

The dung is always laid on Strathaven moſs when the ſeed is ſown, and mixed into the ſoil by means of the harrow: but it would be much better to ſpread the dung whenever the great froſts are gone, in January or February. The ſpring rains would waſh its juices into the ſoil before the ſeed time, and being broken and overturned by the harrow, it would mix into the ſoil, and enrich a new place of the ground where it again reſted. In that way, it would be much more diffuſed over the ſurface, than when thrown on with the ſeed. If the dung is ſpread in January or February, after the froſt is over, the rains which fall in the early part of the ſpring, would waſh its richeſt juices into the earth, while the ſun would not injure it by exhalation. Whereas if the dung is only laid on with the ſeed, the droughts of the ſeed-time and early part of ſummer, dries it into a cinder, and the ſun exhales its beſt qualities in gas. When laid on with the ſeed, the richer ſubſtances in the dung evaporate in air, and the bulky part remains withered like a piece of cork.

That dung forms a rich and powerful manure to a moſs ſoil, is not to be doubted. The propriety, however, of uſing it to the injury of the other land, will fall to be regulated according to exiſting circumſtances.

Urine is another valuable manure for a peat ſoil. The volatile alkali, with which urine abounds, has powerful effects in reducing the antiſeptic and inſoluble qualities of the moſs. The abſurdity of throwing it away has been noticed, and the mode of collecting and mixing it into the moſs-earth, and thereby making both into rich manure, has been mentioned.

Various other ſubſtances will operate as manure to moſs. But it is not of ſuch importance to acquire a knowledge of theſe, as it would be to rouſe the poſſeſſors of moſs ſoil to a diligent uſe of what is already known. Further information would be deſirable, but induſtry is the one thing needful in agriculture.

Cropping of Moſs.

POTATOES are certainly the moſt proper crop on a moſs ſoil the firſt time it is broken up; eſpecially when the moſs is covered with a rough bulky crop of coarſe herbage. If they are planted in the lazy-bed form, with a ſmall quantity of dung, an abundant crop of the very beſt quality may be depended upon. Moſs ground of that deſcription, when moderately dunged, always produces potatoes of the beſt quality, and frequently in great abundance. The ſpade-work is eaſily executed on a moſs ſoil. The trenches, or ſheughs, relieves the moſs of ſuperabundant moiſture; and the crop of potatoes, with the dung, completely rots the fog, bent, and coarſe herbage, and forms them into manure. The bulky ſhaws of the potatoes overſhadowing the ground, create a ſtagnation of air, which, with the fermentation of the dung and herbage, reduces the tenacity of the peat-earth, changes its mechanical arrangement, and forms it into a proper vegetable mould; accelerating, at the ſame time, the putridity and decompoſition of the peat-earth. Wherever potatoes are planted for a firſt crop on a moſs ſoil, it ought to be in the way uſually termed lazy-beds, and if the ſward is not rough, and the herbage bulky, a quantity of ſtraw, fog, fern, ruſhes, bent-graſs, or benty-turf, ſhould be collected, and mixed with the dung, if poſſible, a few weeks before it is uſed; or at any rate laid on the ſward, with the dung under the potato ſeed. The rough and bulky ſubſtances ſerve to keep the moſs open, and give greater ſcope to the ſtems of the potatoes, without which it does not thrive; and as the dung and bulky ſhaws of the potato brings the herbage into ſpeedy putrefaction, they form a rich and powerful manure to the ſoil. Even when that root is planted on dry land, a quantity of ſuch herbage, or of benty-turf, mixed, or laid on with the dung, would be a very great improvement; the one half of the quantity of dung uſually given would ſerve, and the potatoes would be ſtill better.

Raiſing potatoes upon moſs ſoil has been practiſed in Ireland, for about a century paſt; it was introduced into Galloway, and ſome other parts of Scotland, about the middle of laſt century; and it is beginning to be practiſed in many parts of the kingdom. The gentleman who treats of the moſs-culture at Sweenridgemuir in Ayrſhire, has properly deſcribed this mode of reclaiming moſs. Every proprietor of land who has moſs in his eſtate, ought to be poſſeſſed of a copy of that uſeful pamphlet.

The only objection to this mode of reclaiming moſs, is, that it exhauſts too much of the dung, to the prejudice of the other parts of the farm. But if the cultivator of moſs would be at pains to procure a ſufficient quantity of bent, fog, fern, turf, &c. and mix them into the dunghill a few weeks before it is carried to the field, the dung might be made to go three times further than it can do alone, the potatoes would be better, and the ſoil more enriched for an after crop. If the farmers would only purſue the various modes of enlarging the quantity of their dung that have been pointed out, they might be able to apply double the quantity they do at preſent to their farms, and as much more towards reclaiming their moſſes. The want of dung on the farm, proceeds from the want of induſtry in the farmer. It is but for one crop only that dung is wanted on this plan, and the quantity neceſſary will ſoon be more than replaced by the productions of the moſs in the following crops.

It would be great folly to attempt to cultivate a large field of moſs in one ſeaſon. That can only be done by little and little. If a farmer has 100 acres of moſs on his farm, he ought to begin with making one acre or ſo into potatoes the firſt year. The dung neceſſary for that acre would not impoveriſh his other land, and the after crops would ſoon reſtore it, and thereby enable him to break up a larger quantity of moſs; ſo that as he advanced, his dung, his grain, and his gold would be multiplied, and the deſert would, in a few years, be rendered productive.

Oats are certainly the moſt proper crop after potatoes; or even when the moſs has been prepared with manure without a potato crop. When potatoes have been taken, the moſs does not need to be laboured for a ſecond crop. Neither is any new manure neceſſary. It may, however, be proper to apply a ſmall quantity of hot lime, either when the potatoes are raiſed, or when the corn is ſown. The lime ſo applied, will accelerate the putrefaction of the moſs-earth, and add to the ſolidity of the moſs-ſoil. If either a ſmall quantity of freſh dung, or of hot lime, is applied with the ſeed, every ſecond year, the moſs may be continued in crop for many years, without injuring it. Such a ſoil is quite inexhauſtible. The whole moſs is one vaſt collection of undecayed vegetable matter. Its inſolubility renders it unproductive. But if its ſolubility and decompoſition can only be promoted by cauſtic lime, or other manures, it will be impoſſible to injure it by over-cropping, ſo long as one particle of the moſs-earth remains; and were that gone, we ſhould recover the original ſoil, as it was, prior to the formation of the moſs, as will actually be the caſe in progreſs of time, where a well conducted cultivation of the moſs is perſiſted in. Moſs ought always to be cropped with *Friezeland oats*, of which we have many different ſpecies, as Poliſh oats, potato oats, Church's oats, early oats, &c. Theſe being early, are beſt adapted to a peat-ſoil, which is always rather diſpoſed to be late. The peat-ſoil being ſo inexhauſtible, oats, which in this country are always the moſt certain and profitable crop, will, and ought to be preferred. If the ſoil is turned into hay or paſture occaſionally, it ought to be only for two, or, at moſt, three years at a time. By reſting it longer, you are not only deprived of the profits of the corn it might produce, but the ground will ſoon begin to grow wild, and, in a few years, will relapſe into moſs, as before it was begun to be cultivated.

Bear has been ſometimes ſown on moſs in Avendale, and yielded a good return. It is a very common crop on moſs land in the Highlands, where they generally labour it with a ſpade, and it yields an abundant return. This may ſatisfy as to the practicability of rearing bear on moſs. At ſame time, I believe oats will generally be found to be a more certain, and a more profitable crop.

Wheat has been raiſed, and turned out a tolerable crop on Strathaven moſs: but it runs great danger of being thrown out by the heaving of the ground, by the winter and ſpring froſts. Rolling, when the wheat is ſown, and early in the ſpring, would help to ſecure it from the effects of the froſt: but till rollers are framed to be drawn by men, that cannot be done.

Peaſe have been tried on Strathaven moſs, and turned out an excellent crop; but being ſo near the town, could not be protected from the depredations of children.

Beans have likewiſe been tried, and did well; but being alſo liable to be plundered by children, have but ſeldom been ſown. As the roots of beans extend farther into the ſoil than thoſe of any other grain, they are very well ſuited to a moſs ſoil, where it becomes difficult to preſerve moiſture near the ſurface in time of drought. The beans by reaching deep, are ſecure againſt that evil. Both beans and peaſe, if they ſuited otherwiſe, would have the ſame effect that potatoes have, in reducing the tenacity of the moſs, and prompting its putrefaction, ſo that a rich crop of oats might be expected after them.

Turnip have now been well aſcertained to be a moſt valuable crop upon moſs-earth. The mode of raiſing them on that ſoil is now no ſecret in Avendale. Mr. Wilſon of Crewburn, was the firſt who introduced the turnip huſbandry into Avendale moſſes, and, for ſeveral years paſt, he has raiſed moſt luxuriant crops of that valuable root on his moſſes. Mr. Torrance of Blackſcroft, a few years ago, raiſed the beſt crop of turnips upon a piece of moſs in his farm, that I have ever ſeen grow. He ploughed it in ſummer, being too wet to be laboured at any other time; and having ſet as much of it on fire as he could, it lay over winter, in hopes of being cropped with oats in the ſpring. But being too wet for cropping then, he waited the return of the ſummer's drought, when he formed it into ridges, throwing up part of new moſs from the furrows, over the aſhes of what had been burnt, and cropped the whole with turnip, which were not exceeded in value by any in Lanarkſhire. He has ſince taken two crops of excellent oats, and the moſs, formerly not worth one ſhilling per acre, is now worth thirty times that ſum every year. John Mack in Doghillock, and ſeveral others, have begun to follow the examples ſet them in raiſing turnips from moſs, and, I truſt, the practice will ſoon be general in Avendale. The unſpeakable advantage of that root, in a country like Avendale, where the cow and her produce are the chief objects of the farmer's attention, and ſource of his gains, muſt ſoon become obvious to all. Almoſt every farm in the diſtrict has ſome moſs in it, which, at preſent, is conſidered as of no value. If from theſe a weighty crop of turnips can be raiſed, the moſs rendered productive of grain, and twenty times more valuable afterwards, they cannot fail ſoon to become an object of attention. It is truly ſurpriſing that they have not been much more attended to already.

Clover has ſeldom been attempted to be raiſed on the moſſes in Avendale. But the luxuriant crops of that valuable graſs, raiſed on the moſſes in the vicinity of Paiſley, and elſewhere, renders it beyond all doubt, that clover may be cultivated to great advantage on the moſſes in Avendale alſo. The moſs is apt to throw it out in the froſts, during the winter and ſpring: but frequent rolling, the application of hot lime, ſand, clay, &c. are the beſt antidotes againſt that evil. Clover, like other green crops, would powerfully promote the putrefaction of the moſs-earth.

Greens and *cabbages* grow very well on a moſs ſoil. *Coleworts*, *hemp*, and *rape*, are alſo ſaid to grow to great perfection upon moſs. All of theſe ſink their roots deep into the ſoil, which will ſecure them in moiſture from below, when the drought has exhauſted it near the ſurface. All of them, too, by overſhadowing the ſoil, and intercepting the circulation of air and exhalation of moiſture, will, like the peaſe, beans, potatoes, and other green crops, greatly accelerate the putrefaction and decompoſition of the moſs-earth, and ſecure a luxuriant crop or two of oats after them.

Rye-graſs has ſometimes ſucceeded well on moſs; but

Hoſe-graſs, (Holcus lanatus,) is beſt ſuited to a peat ſoil. It riſes ſpontaneouſly on moſs and other looſe ſoils, yields a weighty crop for ſeveral years; and its vigorous and extenſive roots, bind the ſoil like a turf. It forms the weightieſt crop, and makes the beſt of all hay. It is more palatable than the hay made from any other graſs. This ſpecies of graſs has not hitherto been attended to, and cultivated according to its high value.

Many other graſſes might be reared upon a peat ſoil; but theſe that have been mentioned, are ſufficient to ſhow the great utility of moſs-culture.

CONCLUSION.

WHEN I conſider how large a portion of the ſurface of Scotland is now buried deep under cold torpid peat earth; how injurious that ſubſtance is to the atmoſphere, and to vegetation; how rapidly it is increaſing; how eaſily its growth might be interrupted; its pernicious effects remedied by cultivation; how profitable to the proprietor, the poſſeſſor, and the public, ſuch cultivation would be, I cannot refrain from expreſſing ſurpriſe and regret, at the little attention a matter of ſuch vaſt importance has yet met with. To rouſe my countrymen from that aſtoniſhing and culpable indifference, to a matter of the firſt magnitude, is the moſt ardent wiſh of my heart. If theſe remarks ſhall have the leaſt tendency to ſtimulate the proprietors of land, or their tenants, to further exertions in reclaiming moſs, induce others better qualified to throw greater light on the important ſubject, or even to point out the errors I may have fallen into, my moſt ſanguine ambition will be gratified. My ſole object is to draw the attention of the public to a ſubject of great importance, as yet ſtrangely overlooked. If my wiſh ſhall be accompliſhed, I ſhall be extremely happy. If not, I ſhall ſtill have the conſolation of having done my utmoſt for the public good.

FINIS

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